WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

MAR 12

3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO

September 15, 1981

WILSON, OKAMOTO & ASSOCIATES, INC.
Suite 800, 1150 South King Street
Honolulu, Hawaii 96814

Gentlemen:

Subject: Grading Memorandum
Nanakuli Residence Lots - 4th & 5th Series
2nd Increment, Phase I
Nanakuli, Oahu, Hawaii
Tax Map Key: 9-8-07: 1 & 3

The above project was generally constructed with on-site soils. The fill was placed and compacted in thin layers. A soil technician from our office was present at the site on an intermittent basis to observe grading progress and to take density tests. Whenever fill operations were on a continuous basis, a soil technician usually visited the site daily.

Grading Plan dated May 17, 1979 by Wilson, Okamoto & Associates, Inc. was used as a guide for soil testing purposes.

In our opinion, the density test results at the time and at the locations taken were in general conformance with the density requirements of the Revised Ordinances of Honolulu, 1969 As Amended. Because the passage of time may result in changes in soil conditions, we suggest the following precautions be observed:

1. From visual observations and laboratory testing, moderately to highly expansive soils will generally be encountered within the lots in the subdivision except in Lot Nos. 125 thru 130 where the surface soils may be little to non-expansive.

   The house foundations, slabs on ground and pavements should be designed by a qualified engineer for the expansive soil conditions.

   In Lot Nos. 125 thru 130, the house foundations, slabs on ground and pavements should be designed for the actual soil conditions encountered in each lot.

2. Some creep or settlements may occur near the tops of slopes. Foundations near tops of slopes or over sloping ground should be avoided or designed under the guidance of an Engineer.

3. Lot regrading by cutting, filling or altering the drainage pattern may cause ground instability in some situations. For this reason, lot regrading should be avoided or made under the guidance of a Soils Engineer.

Our work on this project does not include the following:

Finish grading of lots not observed or tested by our office, construction of swimming pools, retaining walls, backfilling of utility trenches and other work usually done under the observation of the City's inspector or others.

We have employed accepted engineering and testing procedures and our professional opinions and conclusions are made in accordance with generally accepted soil and foundation engineering principles and practices. However, we do not undertake to guarantee the construction nor do we relieve the contractor of his primary responsibility to produce a completed project conforming to the project plans and specifications.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

By Wallace Wakahiro
Wallace Wakahiro

WW:vl
cc: Dept. of Hawaiian Home Lands

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

September 25, 1979

MEMORANDUM

TO: MR. KEN NAGAI
Wilson, Okamoto & Associates, Inc.

FROM: Walter Lum Associates, Inc.

RE: Nanakuli Residence Lots - 4th & 5th Series
2nd Increment, Phase I
Laboratory Testing of Select Off-site and
On-site Fill Material

This is a follow-up of our telephone conversation regarding the select off-site (Sample No. 1) and on-site (Sample No. 2) materials that were tested in our laboratory for the above project.

Our comments and recommendations are as follows:

Sample No. 1 - Off-site Borrow

Test results indicate that the material is slightly expansive (1.0%+ by the CBR method, California Bearing Ratio of 22.7).

We recommend that the material be approved for select non-expansive material for drainage ditches and for "borrow" in roadways.

Sample No. 2 - On-site Granular Soil

Test results indicate that the material is slightly expansive (2%+ by the CBR method, Plasticity Index of 4I+). The material is fairly granular with about 13% fines passing the No. 200 sieve.

Even though the material tested does not meet the specifications for P.I. requirement of less than 20, it is our opinion that the material may be considered as select material for buttresses with slope heights about 10 ft or less as long as the CBR is greater than 16 and the percent passing the No. 200 sieve is less than 15.

Should the material be approved for the buttress, a change order should be issued to reflect the change from the plans and specifications.

Additional laboratory testing may be required should changes in the material be detected during the grading operations.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

By Wallace Wakahiro
Wallace Wakahiro

WW:vl

Attachment: Laboratory Test Results

cc: Aloha State Corporation
Department of Hawaiian Home Lands,
Attention: Mr. Stanley Wong

NANAKULI RESIDENCE LOTS, 4th & 5th SERIES, INCREMENT 2, PHASE 1

TABLE I___ - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	OFF-SITE		ON-SITE	
SAMPLE NO.	# 1		# 2	
DEPTH BELOW SURFACE	–		–	
DESCRIPTION	BROWN SILTY CLAY W/SOME SAND		LIGHT GRAY BROWN CLAYEY GRAVEL W/SOME SAND & COBBLES	
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1-1/2"			95	
1"			72	
1/2"			39	
#4			30	
#10			23	
#20			19	
#40			16	
#100			14	
#200			13	
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL		NATURAL	
Liquid Limit	42		60	
Plastic Limit	21		19	
Plasticity Index	21		41	
Dilatancy	SLOW		SLOW-NONE	
Toughness	MED.		STIFF	
Dry Strength	MED.		HIGH	
UNIFIED SOIL CLASSIFICATION	CL		GC	
APPARENT SPECIFIC GRAVITY				
CBR TEST (Surcharge - 51 P.S.F.)				
Molding Moisture, %	22		11	
Molding Dry Density, P.C.F.	105		117	
Swell upon saturation, %	1.0		2.4	
CBR at 0.1" Penetration	22.7		16.7	
MOISTURE-DENSITY RELATIONS OF SOILS (ASTM D-1557-70, Method)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

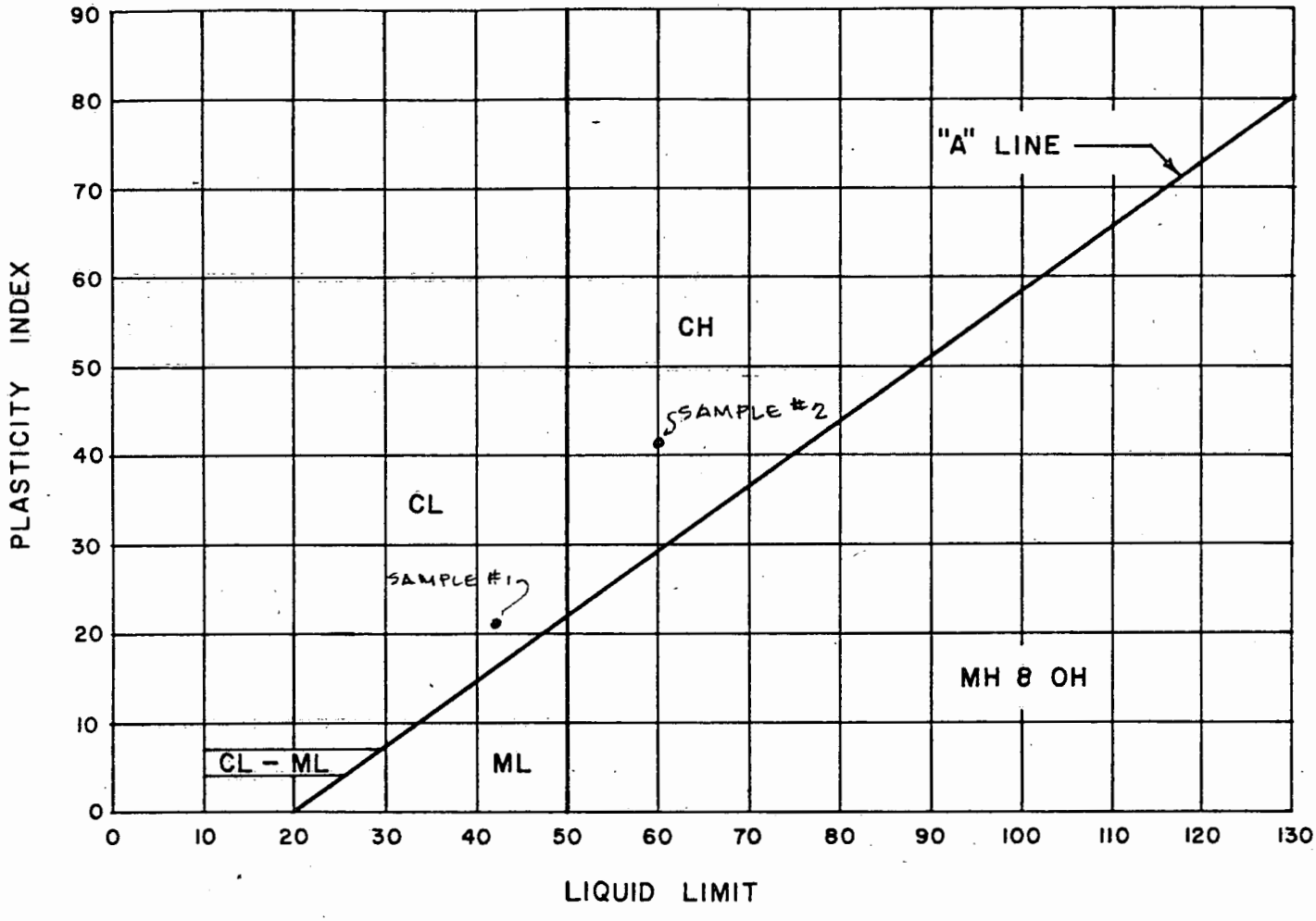
REMARKS:

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 9-21-79 By W.W.

PLASTICITY CHART

PROJECT: NANAKULI RESIDENCE LOTS, 4th & 5th SERIES
INCREMENT 2, PHASE 1
LOCATION: NANAKULI, OAHU, HAWAII



DATE 9-21-79 BY W.W.

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

3-872

TRANSMITTAL FORM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

TO: WILSON, OKAMOTO & ASSOCIATES, INC. **DATE:** October 1, 1979

1150 South King Street, Suite 800

Honolulu, Hawaii 96814

Gentlemen:

Re: NANAKULI RESIDENCE LOTS - 4TH & 5TH SERIES
2ND INCREMENT, PHASE I
LABORATORY TEST REPORT

We Are Sending You Herewith [X] **Under Separate Cover** [ ]

____ Prints	____ Review and comment
____ Location Plan	____ Approval
____ Field Density Test Results	____ Signature
____ Boring Logs	X Your use and files
X Laboratory Test Results	
____ Soil Report	

No. of Copies
Sets 2
Sheets ____

General Remarks:

Based on laboratory test results, it is our opinion that the borrow material may be used as select fill in Nanakuli Residence Lots - 4th & 5th Series, 2nd Increment, Phase I.

If changes in the material are detected, additional testing is recommended.

Yours truly,

WALTER LUM ASSOCIATES, INC.

By W. Wakahiro

cc: Aloha State Corporation
Department of Hawaiian Home Lands

NANAKULI RESIDENCE LOTS, 4th & 5th SERIES, INCREMENT 2, PHASE 1

TABLE I A - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	ON-SITE	OFF-SITE		
SAMPLE NO.	3	4		
DEPTH BELOW SURFACE				
DESCRIPTION	GRAY CLAY W/ GRAVEL & SAND	DARK REDDISH BROWN CLAYEY GRAVEL W/ SAND		
GRAIN-SIZE ANALYSIS (% Passing)				
Sieve 1-1/2"	100	95		
1"	94	89		
1/2"	90	76		
#4	86	67		
#10	83	61		
#20	81	57		
#40	80	54		
#100	78	50		
#200	78	48		
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL		
Liquid Limit	94	51		
Plastic Limit	22	25		
Plasticity Index	72	26		
Dilatancy	NONE	SLOW		
Toughness	VERY STIFF	MEDIUM		
Dry Strength				
UNIFIED SOIL CLASSIFICATION	CH	GC		
APPARENT SPECIFIC GRAVITY	2.83			
CBR TEST (Surcharge - 51 P.S.F.)				
Molding Moisture, %	27.3/48.1*	21.8/25.3*		
Molding Dry Density, P.C.F.	96.6	105.2		
Swell upon saturation, %	11.4	0.8		
CBR at 0.1" Penetration	2.0	32.0		
MOISTURE-DENSITY RELATIONS OF SOILS (ASTM D-1557-70, Method)	A			
Dry to Wet or Wet to Dry	DRY TO WET			
Max. Dry Density (P.C.F.)	101.5			
Optimum Moisture (%)	21.0			

REMARKS: * MOISTURE CONTENT AFTER 4-DAY SOAK

1. OFF-SITE BORROW #4 - RECOMEND APPROVAL FOR (a.) "BORROW" IN ROADWAY PAVEMENTS (b.) SELECT MATERIAL BELOW BUTTRESS AND DITCHES.

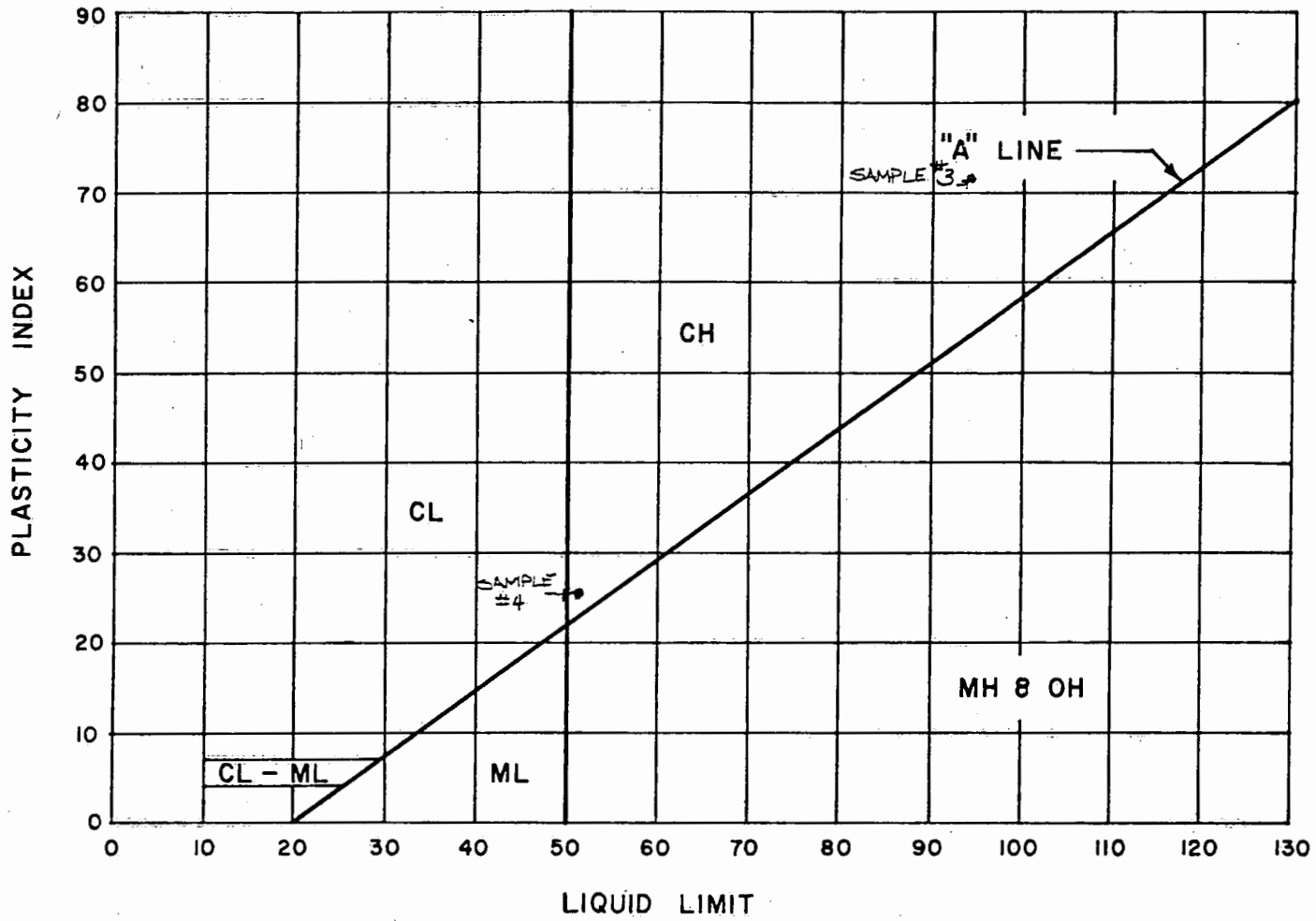
WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 9-28-79 By

PLASTICITY CHART

PROJECT: NANAKULI RESIDENCE LOTS, 4th & 5th SERIES, INCREMENT 2, PHASE 1

LOCATION: NANAKULI, OAHU, HAWAII



DATE 9-28-79 BY

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

8-872

NANAKULI RES. LOT SAMPLE #3

MOISTURE-DENSITY CURVE (ASTM D-1557-70, METHOD D)

PROJECT: NANAKULI RESIDENCE LOTS, 4th & 5th SERIES, 2ND INC., PHASE I

LOCATION: NANAKULI, OAHU, HAWAII

SAMPLE NO.: #3 (ON-SITE)

SAMPLE DESCRIPTION: GRAY CLAY W/SAND & GRAVEL

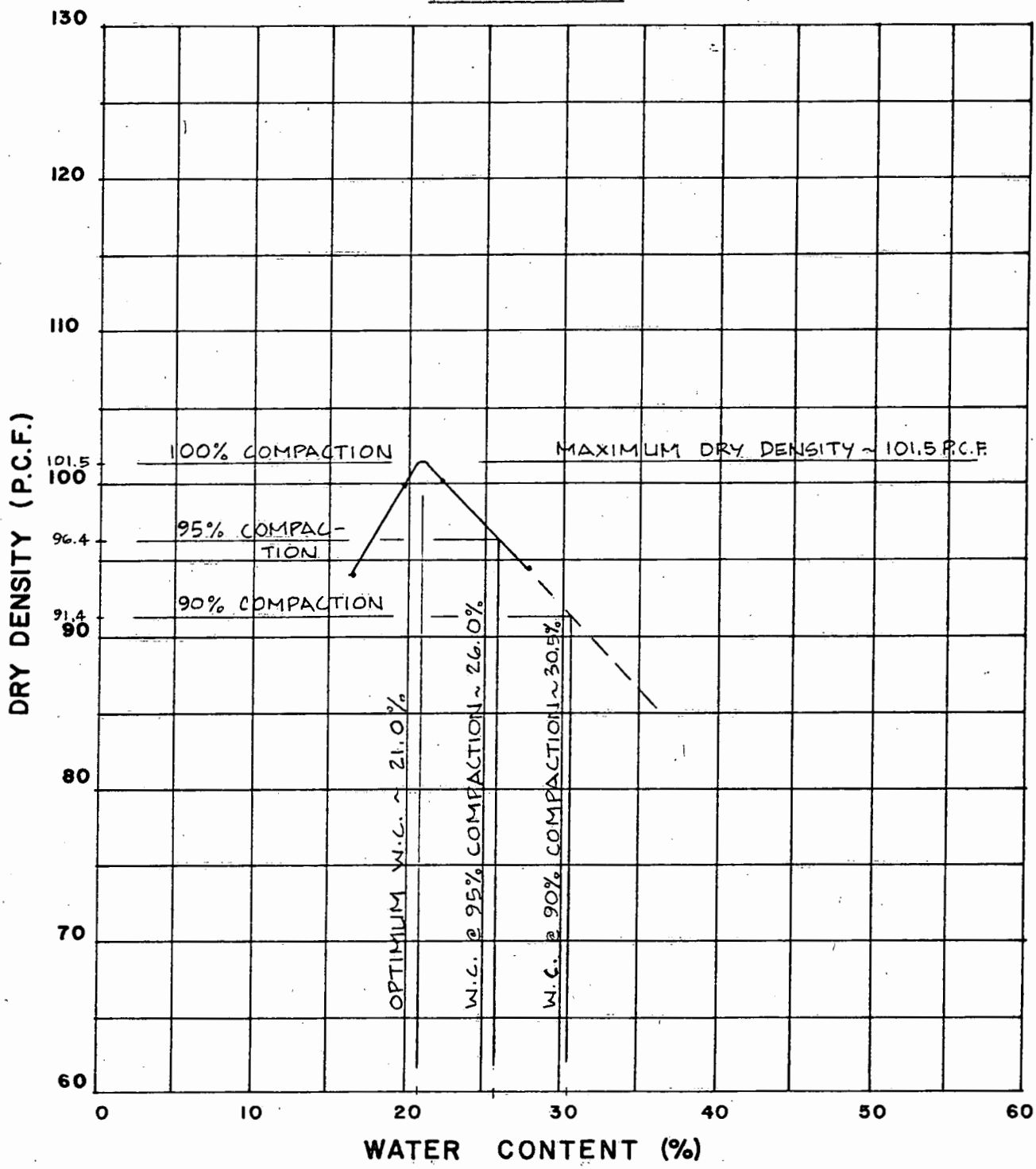
AGGREGATE: 3/4" MINUS

MOLD SIZE: 6.0" ø x 4.584" HT

HAMMER: 10 LBS.

LAYERS: 5

BLOWS: 56/LAYER



WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 9/20/79 BY WL

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

October 24, 1979

MEMORANDUM

TO: MR. KEN NAGAI
Wilson, Okamoto & Associates, Inc.

FROM: Walter Lum Associates, Inc.

RE: Nanakuli Residence Lots - 4th & 5th Series
Increment 2, Phase I

This is a follow-up of our discussions and recommendations regarding an existing fill that was encountered during mass grading and some low, 2:1, slopes without buttressing that were indicated on the grading plan.

In general, our discussions and recommendations covered the following:

1. An existing fill, which appears to be a mixture of soil, some rubbish, tree branches and trunks and other miscellaneous materials, was encountered on Haleakala Road Extension near Sta. 29+00 and may extend to about Sta. 32+00. The existing fill may also extend into Lot Nos. 165 thru 169. The existing fill should be removed and replaced with compacted selected on-site materials.

2. Buttress slopes or 3:1 or flatter slopes were recommended for slopes about 6 ft or less in height in highly plastic clay soils. Buttress slopes or 3:1 slopes were generally indicated on the plans except for some low, 2:1, slopes located within the lots and roadways. Where highly plastic clays are detected in these low slopes during the mass grading work, buttress slopes or flatter slopes should be considered.

It is our understanding that the above recommendations have been approved and the contractor has been notified to proceed with the work.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

By Wallace Wakahiro
Wallace Wakahiro

WW:vl

Attachments: Summaries of Field and Laboratory Test Results
Test Location Sketch
Daily Field Reports

cc: Department of Hawaiian Home Lands
Aloha State Corporation

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS 4th & 5th SERIES, INCREMENT 2, PHASE I

Field Density Test Results as follows:

Ending OCT. 15 1979 Sheet 1 of 3 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***	
9-22-79	118 (1)	2'±	34.2	92.0	101.5	91	
"	120 (1)	11'±	27.1	93.7	"	92	
9-29-79	121 (1)	10'±	27.4	95.6	101.5	94	
10-1-79	122 (1)	14'±	35.7	87.4	101.5	86	TO BE RETESTED & REROLLED
"	123 (1)	16'±	28.8	95.6	"	94	
10-2-79	RETEST 122 (2)	14'±	36.5	90.8	101.5	90	
"	123 (2)	14'±	29.6	97.6	"	97	
10-3-79	120 (2)	8'±	23.9	97.4	101.5	96	
"	122 (3)	10'±	24.4	88.6	"	87	TO BE REROLLED & RETESTED
10-5-79	164 (1)	SELECT FILL BOTTOM BUTTRESS	25.8	104.1	110.5	94	BUTTRESS FILL
"	178 (1)	"	26.6	99.3	"	90	BUTTERESS FILL
10-10-79	RETEST 122 (4)	10'±	29.8	87.9	101.5	87	TO BE REROLLED & RETESTED

* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test #1.. taken in the LOT. shown.

BY Paul J. Kiose

1-675

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
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FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS 4th & 5th SERIES, INCREMENT 2, PHASE I

Field Density Test Results as follows:

Ending OCT. 15 1979 Sheet 2 of 3 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***	
10-10-79	119 (1)	6'±	36.5	88.5	101.5	87	TO BE REPOLLED & RETESTED
"	124 (1)	12'±	36.7	92.0	"	91	
10-11-79	RETEST 122 (5)	10'±	31.8	94.8	101.5	93	
"	124 (2)	9'±	31.2	93.6	"	92	
10-12-79	RETEST 119 (2)	6'±	27.0	97.8	101.5	96	
"	121 (2)	5'±	27.8	99.7	"	98	
"	122 (6)	6'±	27.5	100.8	"	99	
"	123 (3)	8'±	20.2	101.3	"	100	
10-15-79	124 (3)	7'±	33.0	90.8	101.5	89	HARD OK
"	133 (1)	12'±	32.7	89.9	"	89	HARD OK
"	134 (1)	11'±	32.7	93.7	"	92	

* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test #1.. taken in the LOT. shown.

BY Paul F. Lucas

1-675

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO

3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS 4th & 5th
SERIES INCREMENT 2 PHASE 1

Field Density Test Results as follows:

Ending OCT. 15 1979 Sheet 3 of 3 Sheets

Date	TEST NO.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***	
9-21-79	HALEAKALA AVE. STA. 28+00± (1)	4'±	27.0	95.0	101.5	94	
"	HALEAKALA AVE. STA. 28+00± (2)	3'±	37.0	87.0	"	86	TO BE REROLLED & RETESTED
9-25-79	HALEAKALA AVE STA. 28+00± (3)	RETEST 3'±	33.9	93.3	101.5	92	

★ Approximate depth below finish grade.

★★ Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

★★★ Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test #1 ..... taken in the ROAD ..... shown.

BY W Wakahiro

NANAKULI RESIDENCE LOTS, 4th & 5th SERIES, INCREMENT 2, PHASE 1

TABLE I A - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	OFF-SITE			
SAMPLE NO.	1			
DEPTH BELOW SURFACE				
DESCRIPTION	BROWN SILTY CLAY W/ SOME SAND			
GRAIN-SIZE ANALYSIS				
(% Passing)				
Sieve				
1-1/2"				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL *			
Liquid Limit	42			
Plastic Limit	21			
Plasticity Index	21			
Dilatancy	SLOW			
Toughness	MEDIUM			
Dry Strength	MEDIUM			
UNIFIED SOIL CLASSIFICATION	CL			
APPARENT SPECIFIC GRAVITY				
CBR TEST				
(Surcharge - 51 P.S.F.)				
Molding Moisture, %	22 *			
Molding Dry Density, P.C.F.	105			
Swell upon saturation, %	1.0			
CBR at 0.1" Penetration	22.7			
MOISTURE-DENSITY RELATIONS OF SOILS				
(ASTM D-1557-70, Method)	A			
Dry to Wet or Wet to Dry	DRY TO WET			
Max. Dry Density (P.C.F.)	110.5			
Optimum Moisture (%)	20.0			

REMARKS:

* TEST RESULTS WERE SUBMITTED SEPT. 25, 1979.

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 10-9-79 By

NANAKULI RES. LOTS, 4TH & 5TH SERIES SAMPLE # 1 (5')

MOISTURE-DENSITY CURVE (ASTM D-1557-70, METHOD A)

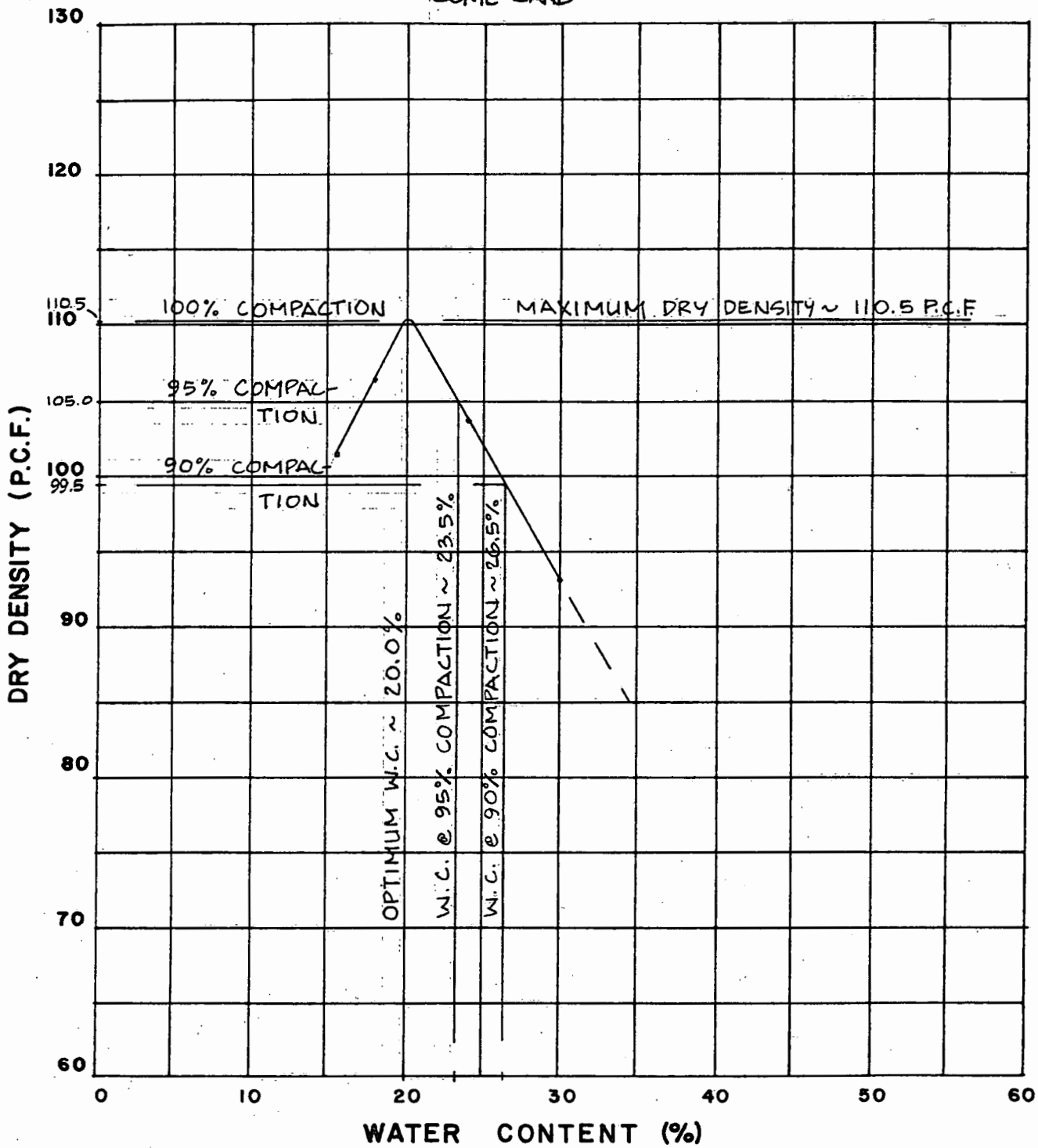
PROJECT: NANAKULI RESIDENCE LOTS, 4th & 5th SERIES, INCREMENT 2, PHASE 1

LOCATION: NANAKULI, OAHU, HAWAII

SAMPLE NO.: 1

SAMPLE DESCRIPTION: BROWN SILTY CLAY W/ SOME SAND

AGGREGATE: 1/4" MINUS
MOLD SIZE: 4.0"ϕ x 4.584" HT.
HAMMER: 10 LBS.
LAYERS: 5
BLOWS: 25/LAYER



WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 10/3/79 BY WM

NANAKULI RESIDENCE LOTS, 4TH & 5TH SERIES,
INCREAMENT 2, PHASE I

TABLE I___ - SUMMARY OF LABORATORY TEST RESULTS

~~BORING NO.~~	PIT 1 & 2 (NEAR LOT 128)		CHANNEL EXCAVATION STOCKPILE	
SAMPLE NO.	#5		#6	
DEPTH BELOW SURFACE	—			
DESCRIPTION	MOTTLED TAN BROWN CLAYEY GRAVEL W/ SAND		GRAY BROWN & TAN CLAYEY GRAVEL W/SAND	
GRAIN-SIZE ANALYSIS (% Passing)				
Sieve				
1-1/2"	79		65	
1"	72		76	
1/2"	60		67	
#4	50		57	
#10	42		50	
#20	32		44	
#40	25		41	
#100	17		38	
#200	14		37	
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL		NATURAL	
Liquid Limit	40		66	
Plastic Limit	20		20	
Plasticity Index	20		46	
Dilatancy	SLOW		SLOW	
Toughness	MED.-STIFF		STIFF	
Dry Strength	MED.-HIGH		VERY HIGH	
UNIFIED SOIL CLASSIFICATION	GC		GC	
APPARENT SPECIFIC GRAVITY				
CBR TEST (Surcharge - 51 P.S.F.)				
Molding Moisture, %	14.5			
Molding Dry Density, P.C.F.	112.0			
Swell upon saturation, %	0.4			
CBR at 0.1" Penetration	43.0			
MOISTURE-DENSITY RELATIONS OF SOILS (ASTM D-1557-70, Method)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

REMARKS:

1. RECOMMEND APROVAL FOR SELECT GRANULAR FILL FOR BUTTRESS — SAMPLE #5.
2. RECOMMEND FOR GENERAL FILL - SAMPLE #6

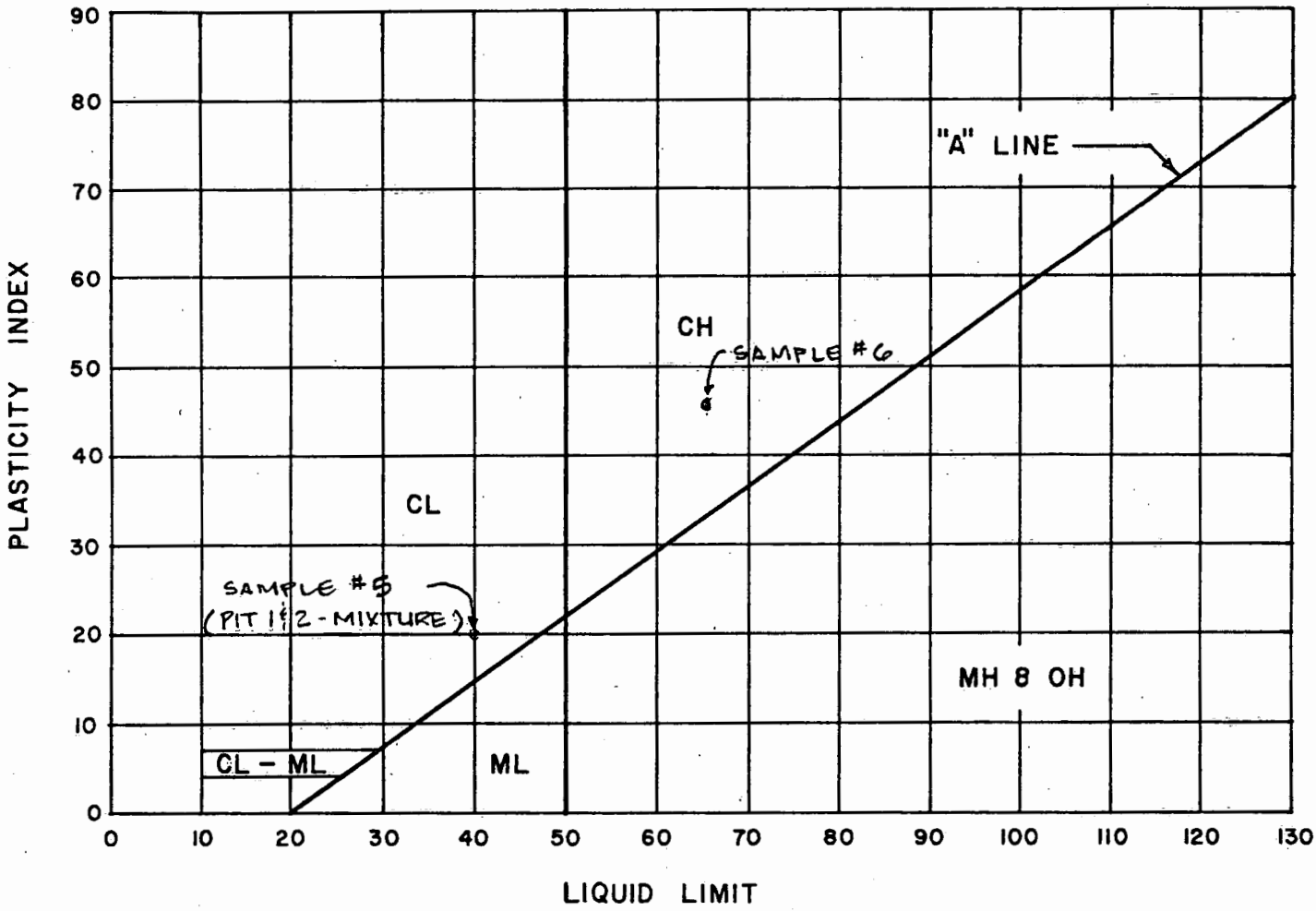
WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 10/22/79 By WL

PLASTICITY CHART

PROJECT: NANAKULI RESIDENCE LOTS, 4TH & 5TH SERIES, INCREAMENT 2, PHASE I

LOCATION: NANAKULI, OAHU, HAWAII



DATE 10/22/79 BY WN

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

B-872

TRANSMITTAL FORM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

TO: WILSON, OKAMOTO & ASSOCIATES, INC.
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

DATE: November 14, 1979

Gentlemen:

Re: NANAKULI RESIDENCE LOTS - 4TH & 5TH SERIES
INCREMENT 2, PHASE 1
FIELD DENSITY TEST REPORT

We Are Sending You Herewith [X] Under Separate Cover [ ]

____ Prints	____ Review and comment
_X_ Location Plan	____ Approval
_X_ Field Density Test Results	____ Signature
____ Boring Logs	_X_ Your use and files
_X_ Laboratory Test Results	
____ Soil Report	
X Technician's Daily Field Report	

No. of Copies
Sets 2
Sheets ____

General Remarks:

For period ending November 6, 1979.

cc: Department of Hawaiian Home Lands
Attn: Mr. Stanley Wong
Aloha State Corporation

Yours truly,

WALTER LUM ASSOCIATES, INC.

By M. Nakahara

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
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3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS
4TH & 5TH SERIES-INCREMENT 2

Field Density Test Results as follows: PHASE I

Ending NOVEMBER 6, 19 79 Sheet 1 of 2 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***	
10-16-79	166 (1)	0'±	34.2	91.8	101.5	90	
"	169 (1)	0'±	34.6	89.2	"	88	HARD
10-19-79	123 (1)	4'	32.1	91.4	101.5	90	
"	164 (1)	0'±	27.8	90.8	"	89	HARD
10-22-79	120 (1)	4'±	28.9	93.1	101.5	92	
"	133 (1)	9'±	29.9	92.9	"	92	
10-23-79	158 (1)	0'±	20.0	101.1	110.5	91	
"	162 (1)	0'±	20.4	102.8	"	93	
"	167 (1)	0'±	20.2	106.4	"	96	
"	174 (1)	0'	20.3	103.9	"	94	
10-24-79	160 (1)	+ 2'	19.8	103.2	116	89	HARD
"	165 (1)	+ 2'	18.1	103.5	"	89	HARD
"	166 (2)	+ 3'	17.4	100.8	"	87	TO BE REROLLED & RETESTED
"	167 (2)	+ 1'	16.7	102.8	"	89	HARD

* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test ..1... taken in the LOTS shown.

BY AKH

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS
4TH & 5TH SERIES - INCREMENT 2
Field Density Test Results as follows: PHASE I

Ending NOVEMBER 6, 19 79 Sheet 2 of 2 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***	
10-25-79	157 (1)	+2'	16.5	104.8	116	90	
"	160 (2)	+4'	13.2	108.6	"	94	
"	166 (3)	+3'	18.3	108.2	"	93	RETEST
11-5-79	179 (1)	0'±	29.6	90.2	101.5	89	HARD
11-6-79	160 (3)	+8'	14.5	104.8	116	90	
"	162 (2)	+6'	16.7	103.9	"	90	
"	165 (2)	+7'	17.5	105.7	"	91	

* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test . . 1 . . . taken in the . LOTS shown.

BY AKH

NANAKULI RESIDENCE LOTS
4TH & 5TH SERIES INCREMENT 2 - PHASE 1
TABLE I___ - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	ON-SITE	ON-SITE	ON-SITE	OFF-SITE
SAMPLE NO.	7	8	9	10
DEPTH BELOW SURFACE	NEAR LOT 128	DRAIN DITCH	DRAIN DITCH	(P.C.&R.)
DESCRIPTION	TAN BROWN CLAYEY SAND&GRAVEL	TAN BROWN CLAYEY SAND & GRAVEL	TAN BROWN CLAYEY SAND & GRAVEL W/GRAY BROWN CLAY	REDDISH BROWN SILTY GRAVEL W/SAND
GRAIN-SIZE ANALYSIS				
(% Passing)				
Sieve				
1-1/2"	95	89		79
1"	80	84		59
1/2"	66	74		39
#4	56	62		25
#10	46	50		18
#20	34	36		14
#40	26	27		12
#100	19	18		10
#200	16	17		9
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NON-PLASTIC NATURAL		NATURAL
Liquid Limit	43	—		35
Plastic Limit	21	—		20
Plasticity Index	22	—		15
Dilatancy	SLOW	—		RAPID-SLOW
Toughness	MEDIUM	—		WEAK
Dry Strength	MEDIUM	—		LOW
UNIFIED SOIL CLASSIFICATION	GC	SM	(GC)	GP-GC
APPARENT SPECIFIC GRAVITY		—		
CBR TEST				
(Surcharge - 51 P.S.F.)				
Molding Moisture, %	15.3/21.8*	11.8/23.9*	13.4/37.3*	11.5/13.8*
Molding Dry Density, P.C.F.	112.4	114.5	110.4	131.3
Swell upon saturation, %	0.3	2.8	12.8	0.1
CBR at 0.1" Penetration	78	18	2.4	93
MOISTURE-DENSITY RELATIONS OF SOILS				
(ASTM D-1557-70, Method)	D			
Dry to Wet or Wet to Dry	DRY TO WET			
Max. Dry Density (P.C.F.)	116			
Optimum Moisture (%)	16			

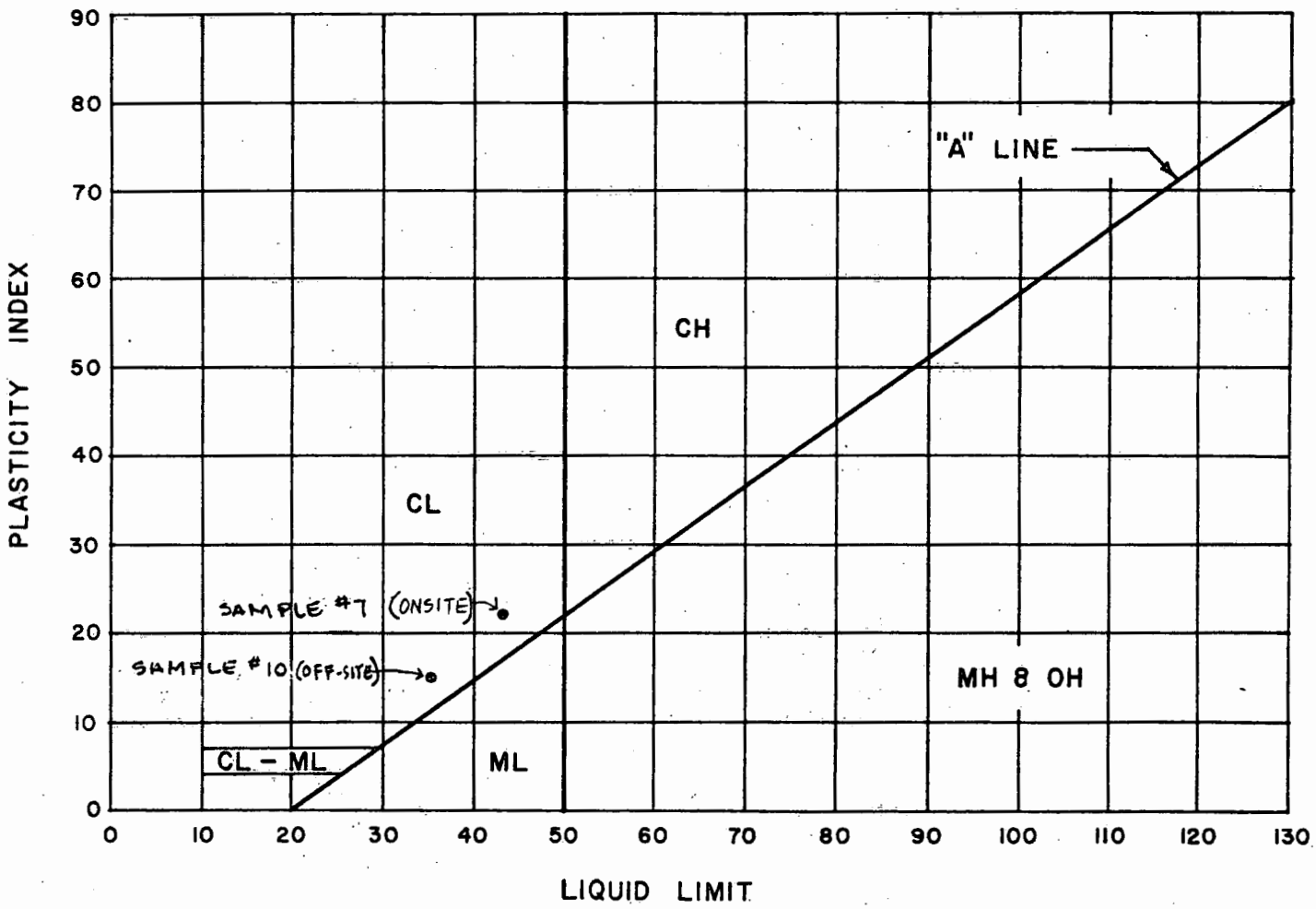
REMARKS: 1. *MOISTURE CONTENT AFTER 4-DAY SOAK
2. SAMPLES #7 & 10 - RECOMMEND APPROVAL AS "SELECT BORROW" FOR ROADWAYS & FOR BUTTRESS FILL.
3. SAMPLE #8 - RECOMMEND FOR "BORROW"
4. SAMPLE #9 - RECOMMEND FOR GENERAL FILL.

Date 11-8-79 By ARH

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

PLASTICITY CHART

PROJECT: NANAKULI RESIDENCE LOTS 4TH & 5TH SERIES INCREMENT 2 PHASE 1
LOCATION: NANAKULI, OAHU, HAWAII



DATE 11-8-79 BY AKH

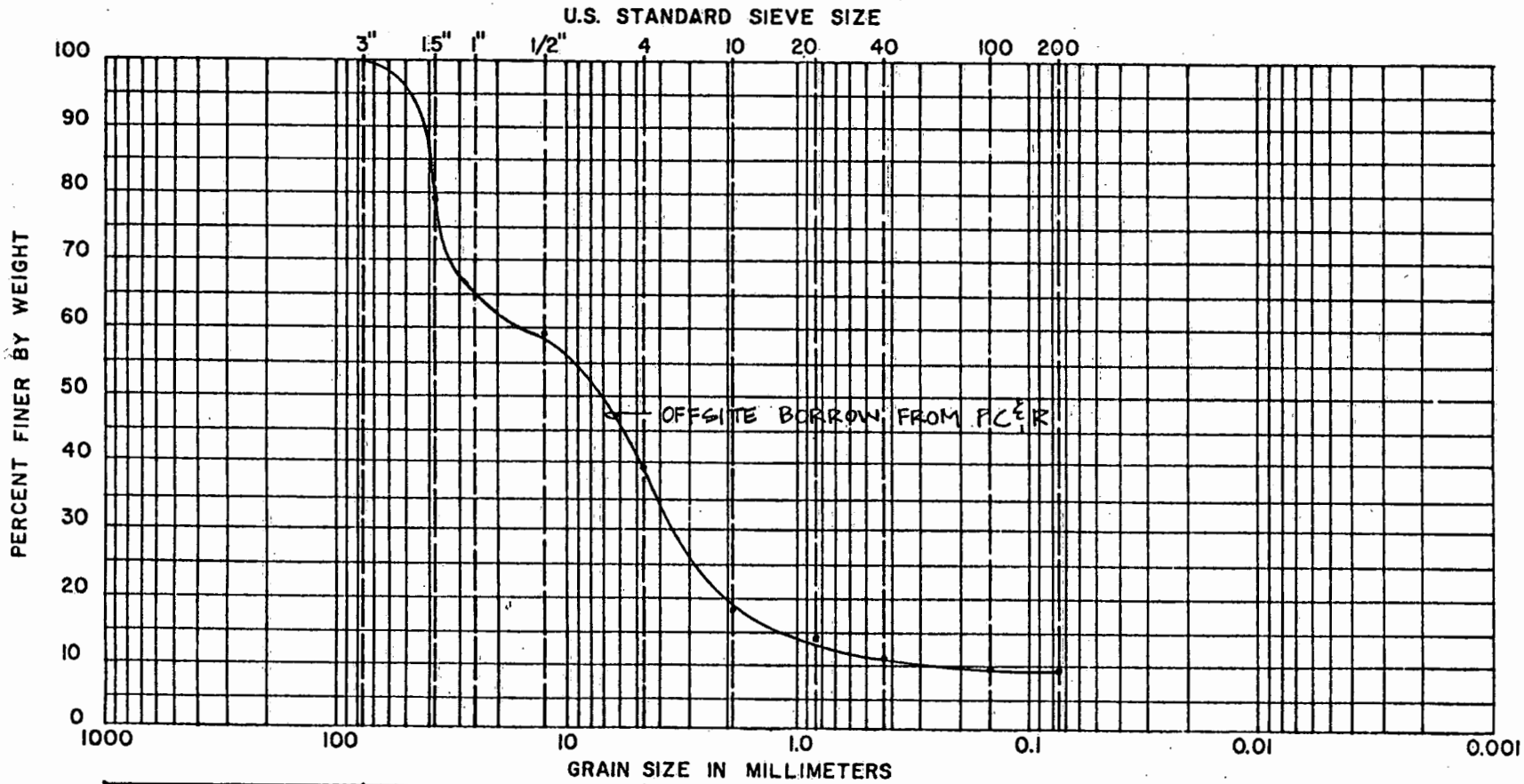
WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

OFFSITE BORROW FROM PC&R - 2
Sample 2

GRAIN-SIZE ANALYSIS CURVE

PROJECT: NANAKULI RESIDENCE LOTS 4TH & 5TH SERIES INCREMENT 2 PHASE 2

LOCATION: NANAKULI, OAHU, HAWAII



COBBLE	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

DATE 11/2/79 BY wn

MOISTURE-DENSITY CURVE (ASTM D-1557-70, METHOD D)

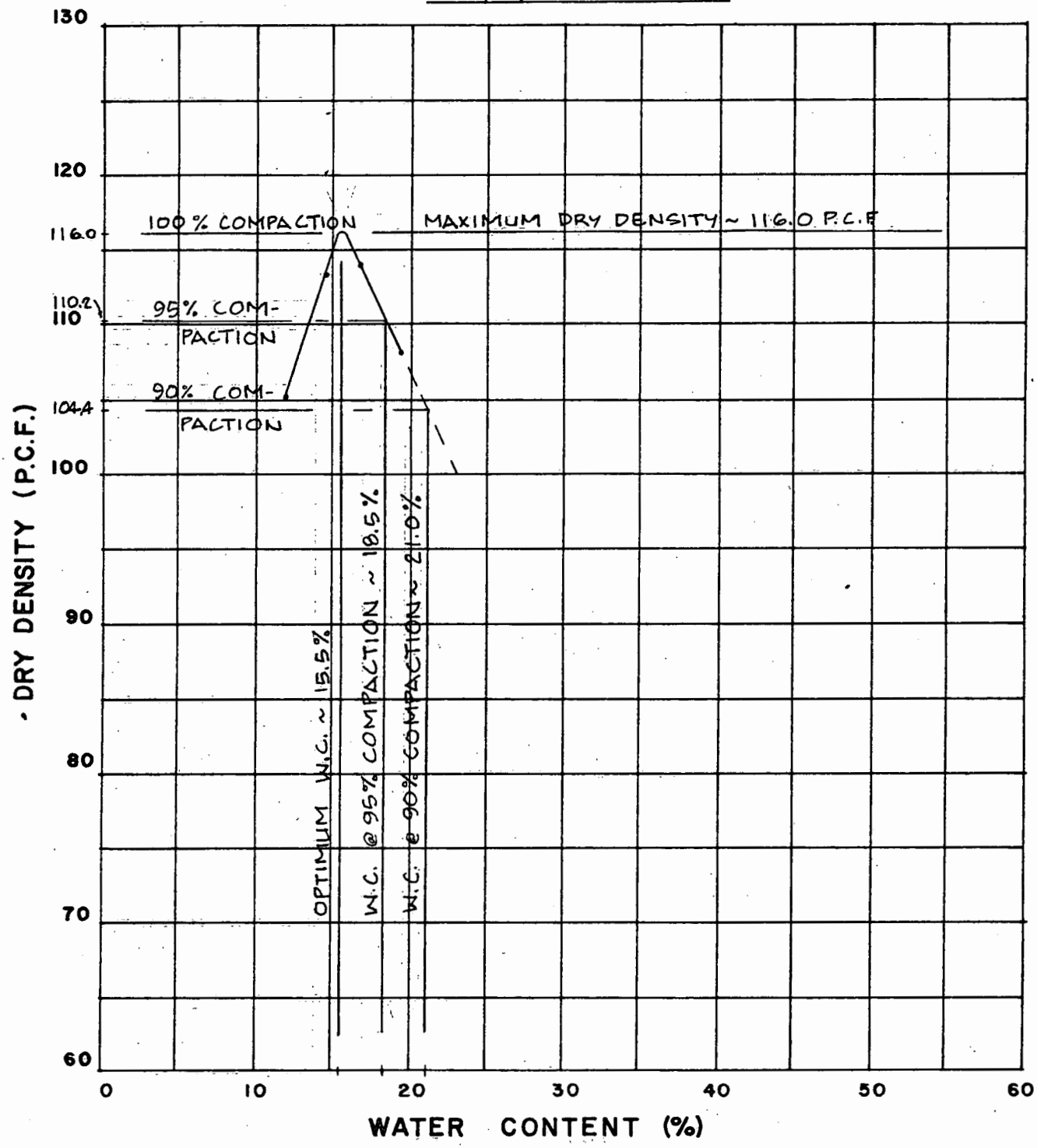
PROJECT: NANAKULI RESIDENCE LOTS
4TH & 5TH SERIES - INCREMENT 2 PHASE 1

LOCATION: NANAKULI, OAHU, HAWAII

SAMPLE NO.: SAMPLE #1

SAMPLE DESCRIPTION: TAN BROWN CLAYEY SAND & GRAVEL

AGGREGATE: 3/4" MINUS
MOLD SIZE: 6.0"ϕ X 4.584" HT.
HAMMER: 10 LBS.
LAYERS: 5
BLOWS: 56/LAYER



WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 10/25/79 BY wm

TRANSMITTAL FORM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

TO: WILSON, OKAMOTO & ASSOCIATES, INC.
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

DATE: December 11, 1979

Gentlemen:

Re: NANAKULI RESIDENCE LOTS - 4TH & 5TH SERIES
INCREMENT 2, PHASE 1
FIELD DENSITY TEST REPORT

We Are Sending You Herewith [X] Under Separate Cover [ ]

___ Prints	___ Review and comment
X Location Plan	___ Approval
X Field Density Test Results	___ Signature
___ Boring Logs	X Your use and files
___ Laboratory Test Results	
___ Soil Report	
X Technician's Daily Field Report	

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General Remarks:

For period ending December 7, 1979.

cc: Department of Hawaiian Home Lands
Attn: Mr. Stanley Wong
Aloha State Corporation

Yours truly,

WALTER LUM ASSOCIATES, INC.

By A. Wakahiro

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS 4TH & 5TH SERIES, INCREMENT 2
PHASE I

Field Density Test Results as follows:

Ending December 7, 1979 Sheet 1 of 2 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***	
11-7-79	158 (1)	+ 8'	12.5	113.2	116	98	
"	160 (1)	+10'	16.8	104.6	"	90	
"	161 (1)	+12'	16.3	104.9	"	91	
11-13-79	159 (1)	+ 14'	16.0	106.8	116	92	
"	175 (1)	+4'	24.3	96.1	"	83	TO BE REROLLED & RETESTED
"	178 (1)	+2'	21.9	105.9	"	91	
11-14-79	157 (1)	0'±	18.6	100.0	110.5	90	
"	HALEAKALA AVENUE (1)	+2	21.1	100.2	"	91	
11-15-79	121 (1)	3'±	33.4	87.5	101.5	86	CLAY-85% REQD
"	175 (2)	+4'	21.8	104.3	116	90	RETEST
11-19-79	174 (1)	+4'	18.6	108.4	116	93	
"	180 (1)	+5'	19.5	106.5	"	92	

* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D 1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test # 1 taken in the LOT shown.

BY M. Ishida

I-875

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

HANAKULI RESIDENCE LOTS
4th & 5th SERIES INCREMENT 2
PHASE I

Field Density Test Results as follows:

Ending December 7, 1979 Sheet 2 of 2 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***	
11-20-79	157 (2)	+18'	15.9	104.0	116	90	
"	HALEAKALA AVE (2)	+3'	18.8	112.2	"	97	
11-21-79	161 (2)	+3'	15.2	109.7	116	95	
"	162 (1)	+5'	15.8	108.3	"	93	
11-28-79	162 (2)	+8'	13.7	105.5	116	91	
"	164 (1)	+7'	14.4	110.4	"	95	
12-6-79	HALEAKALA AVE (3)	+3'	15.5	88.6	116	76	TO BE REROLLED & RETESTED
12-7-79	HALEAKALA AVE (4)	+3'	13.4	110.7	116	95	RETEST OF #3
"	HALEAKALA AVE (5)	+3'	11.9	92.2	"	80	TO BE REROLLED & RETESTED
"	HALEAKALA AVE (6)	+3'	19.4	105.3	"	91	RETEST OF #5

* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test #1 taken in the LOT shown.

BY M. Kikuchi

1-675

TRANSMITTAL FORM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7921

TO: WILSON, OKAMOTO & ASSOCIATES, INC.
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

DATE: January 24, 1980

Gentlemen:

Re: NANAKULI RESIDENCE LOTS - 4TH & 5TH SERIES
INCREMENT 2, PHASE I
FIELD DENSITY TEST REPORT

We Are Sending You Herewith [X] Under Separate Cover [ ]

____ Prints	____ Review and comment
____ Location Plan	____ Approval
____ Field Density Test Results	____ Signature
____ Boring Logs	_X_ Your use and files
_X_ Laboratory Test Results	
____ Soil Report	

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General Remarks:

Recommend off-site borrow material from Waipahu be approved for general fill, impermeable select fill and "borrow" for roadway pavements. Approval from the City & County of Honolulu is required prior to placing borrow.

If changes in the material is detected, additional testing is recommended.

Yours truly,

WALTER LUM ASSOCIATES, INC.

By _____

cc: Department of Hawaiian Home Lands,
Attn: Mr. Stanley Wong
Aloha State Corporation

NANAKULI RESIDENCE LOTS
4th & 5th INCREMENT - PHASE I

TABLE I___ - SUMMARY OF LABORATORY TEST RESULTS

~~BORING NO.~~	OFF-SITE BORROW			
SAMPLE NO.	FROM WAIPAHU			
DEPTH BELOW SURFACE				
DESCRIPTION	REDDISH BROWN SILTY CLAY			
GRAIN-SIZE ANALYSIS				
(% Passing)				
Sieve				
1-1/2"				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL			
Liquid Limit	59			
Plastic Limit	30			
Plasticity Index	29			
Dilatancy	SLOW			
Toughness	MED. STIFF			
Dry Strength	Med.			
UNIFIED SOIL CLASSIFICATION	MH-CH			
APPARENT SPECIFIC GRAVITY				
CBR TEST				
(Surcharge - 51 P.S.F.)				
Molding Moisture, %	28			
Molding Dry Density, P.C.F.	97.6			
Swell upon saturation, %	0.4			
CBR at 0.1" Penetration	14.3			
MOISTURE-DENSITY RELATIONS OF SOILS				
(ASTM D-1557-70, Method)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

REMARKS:

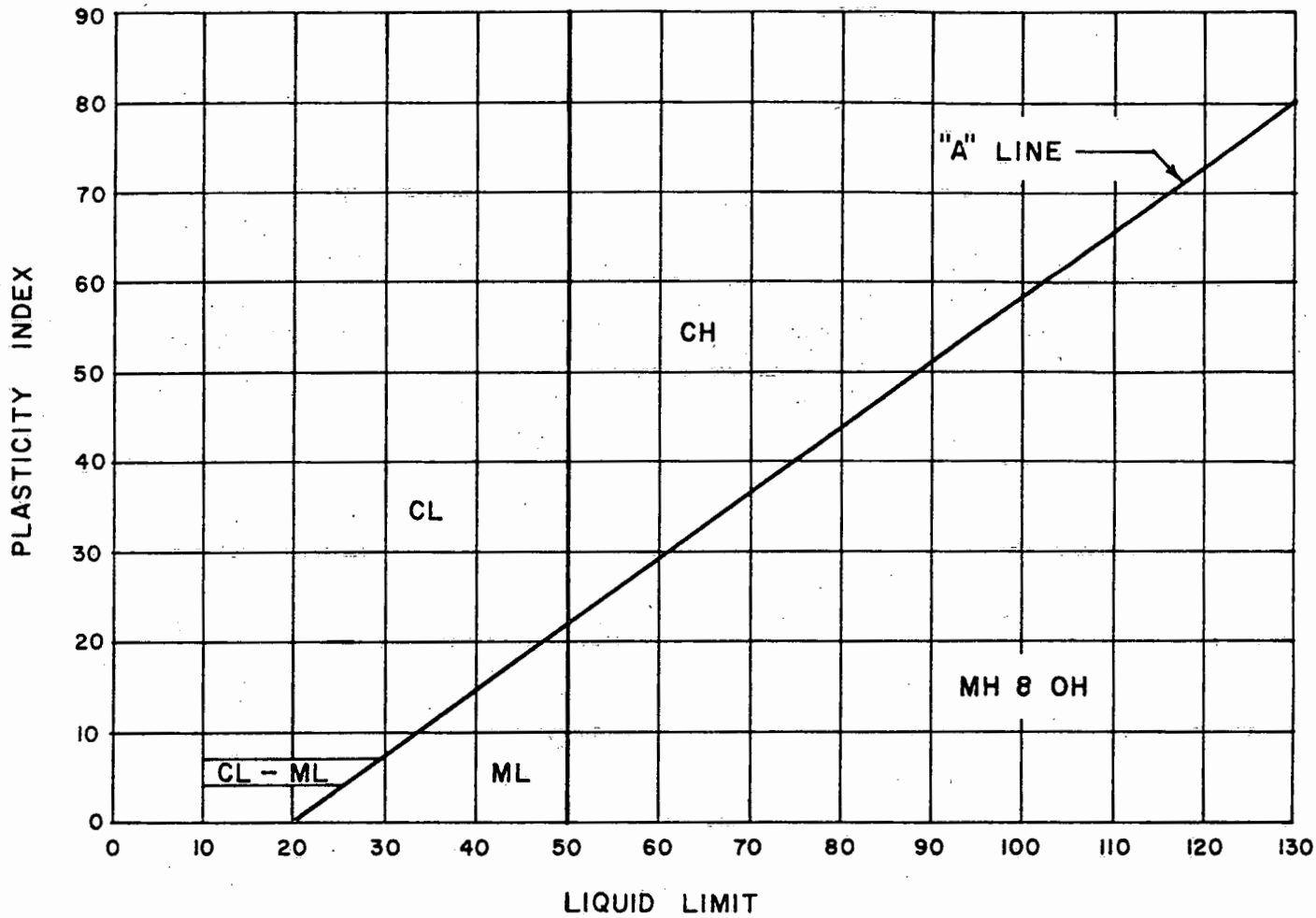
WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 1-24-80 By W.N.

PLASTICITY CHART

PROJECT: NANAKULI RESIDENCE LOTS 4th & 5th INC. - PHASE I

LOCATION: NANAKULI, OAHU, HAWAII



DATE 1-23-80 BY W.W.

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

8-872

TRANSMITTAL FORM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

TO: WILSON, OKAMOTO & ASSOCIATES, INC. **DATE:** January 31, 1980

1150 South King Street, Suite 800

Honolulu, Hawaii 96814

Gentlemen:

Re: NANAKULI RESIDENCE LOTS - 4TH & 5TH SERIES

INCREMENT 2, PHASE I

FIELD DENSITY TEST REPORT

We Are Sending You Herewith [X] **Under Separate Cover** [ ]

____ Prints	____ Review and comment
_X_ Location Plan	____ Approval
_X_ Field Density Test Results	____ Signature
____ Boring Logs	_X_ Your use and files
_X_ Laboratory Test Results	
____ Soil Report	
_X_ Technician's Daily Field Reports	

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General Remarks:

For period ending January 25, 1980.

cc: Department of Hawaiian Home Lands
Attn: Mr. Stanley Wong
Aloha State Corporation

Yours truly,

WALTER LUM ASSOCIATES, INC.

By W. A. Watanabe

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO

3039 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7831

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS
4TH & 5TH SERIES, INCREMENT 2
PHASE 1

Field Density Test Results as follows:

Ending JANUARY 25, 1980 Sheet 1 of 1 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***	
1-3-80	123 (1)	4'±	31.1	90.6	101.5	89	
"	124 (1)	3'±	30.5	81.0	"	80	TO BE REROLLED & RETESTED
1-4-80	124 (2)	3'±	37.2	87.0	101.5	86	RETEST
"	HALEAKALA AVE SLOPE (1)	3'±	43.7	83.9	"	83	TO BE REROLLED & RETESTED
1-7-80	HALEAKALA AVE SLOPE (2)	3'±	29.6	92.0	101.5	91	RETEST
"	HALEAKALA AVE SLOPE (3)	2'±	23.7	94.7	"	93	
1-22-80	BUTTRESS (4)	1'±	17.1	107.4	116	93	
1-23-80	BUTTRESS (5)	1'±	16.0	106.6	116	92	
"	BUTTRESS (6)	1'±	16.6	108.4	"	93	
"	HALEAKALA AVE SLOPE (7)	1'±	38.6	82.5	98.5	84	TO BE REROLLED & RETESTED
1-25-80	HALEAKALA AVE SLOPE (8)	1'±	32.0	89.9	98.5	91	
"	22 (1)	3'±	23.8	95.3	"	97	
"	21 (1)	5'±	32.5	89.6	"	91	
"	154 (1)	0'±	25.6	89.0	"	90	

* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test #1.. taken in the LOTS shown.

BY M Kikuchi

NANAKULI RESIDENCE LOTS
4TH & 5TH SERIES, INCREMENT 2, PHASE 1

TABLE I___ - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	#4			
SAMPLE NO.	OFFSITE BORROW			
DEPTH BELOW SURFACE	FROM PC & R			
DESCRIPTION	REDDISH BROWN CLAYEY SILT W/SOME GRAVEL			
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1-1/2"				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Dilatancy				
Toughness				
Dry Strength				
UNIFIED SOIL CLASSIFICATION				
APPARENT SPECIFIC GRAVITY				
CBR TEST (Surcharge - 51 P.S.F.)				
Molding Moisture, %				
Molding Dry Density, P.C.F.				
Swell upon saturation, %				
CBR at 0.1" Penetration				
MOISTURE-DENSITY RELATIONS OF SOILS				
(ASTM D-1557-70, Method)	D			
Dry to Wet or Wet to Dry	DRY TO WET			
Max. Dry Density (P.C.F.)	98.5			
Optimum Moisture (%)	25.5			

REMARKS:

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 1-25-80 By MK

MOISTURE-DENSITY CURVE (ASTM D-1557-70, METHOD 'D')

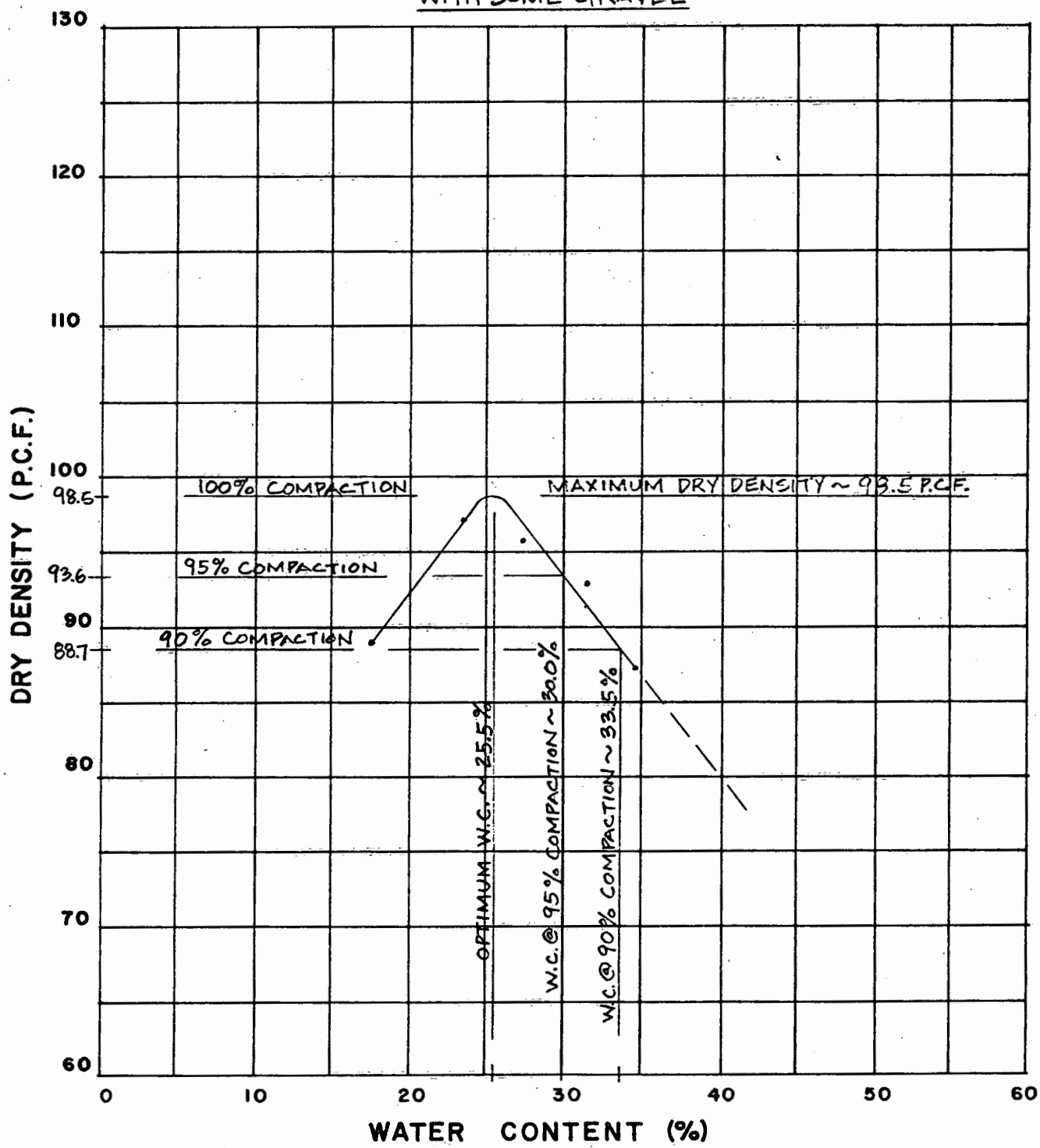
PROJECT: NANAKULI RESIDENCE LOTS
4TH & 5TH SERIES, INCREMENT 2, PHASE 1

LOCATION: NANAKULI, OAHU, HAWAII

SAMPLE NO.: OFFSITE BORROW #4 FROM PC&R

SAMPLE DESCRIPTION: REDDISH BRN. CLAYEY SILT WITH SOME GRAVEL

AGGREGATE: 3/4" MINUS
MOLD SIZE: 6.0"ϕ x 4.584"
HAMMER: 10 LBS.
LAYERS: 5 LAYERS
BLOWS: 56/LAYER



WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 12-27-79 BY GYS

TRANSMITTAL FORM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

TO: WILSON, OKAMOTO & ASSOCIATES, INC. DATE: March 18, 1980

1150 South King Street, Suite 800

Honolulu, Hawaii 96814

Gentlemen:

Re: NANAKULI RESIDENCE LOTS - 4TH & 5TH SERIES
INCREMENT 2, PHASE I
FIELD DENSITY TEST REPORT

We Are Sending You Herewith [X] Under Separate Cover [ ]

____ Prints	____ Review and comment
_X_ Location Plan	____ Approval
_X_ Field Density Test Results	____ Signature
____ Boring Logs	_X_ Your use and files
_X_ Laboratory Test Results	
____ Soil Report	

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General Remarks:

For period ending February 29, 1980.

cc: Department of Hawaiian Home Lands
Attn: Mr. Stanley Wong
Aloha State Corporation

Yours truly,

WALTER LUM ASSOCIATES, INC.

By E. Wakahiro

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS 4th & 5th SERIES
INCREMENT 2, PHASE 1

Field Density Test Results as follows:

Ending FEBRUARY 29, 1980 Sheet 1 of 2 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***
2-4-80	20 (1)	2'±	36.3	85.8	101.5	85
"	21 (1)	1'±	27.8	91.5	"	90
2-5-80	23 (1)	1'±	34.9	87.9	101.5	87
"	105 (1)	1'±	31.3	90.9	98.5	92
"	108 (1)	1'±	27.7	92.9	"	94
2-7-80	21 (2)	0'±	36.5	86.1	101.5	85
"	44 (1)	0'±	27.3	96.0	"	95
"	120 (1)	2'±	31.4	89.1	"	88
"	123 (1)	2'±	29.9	90.8	"	89
"	174 (1)	SUBGRADE	23.1	96.9	101	96
"	177 (1)	SUBGRADE	25.5	92.4	"	91
2-11-80	174 (2)	SUBGRADE	29.3	92.3	101	91
"	177 (2)	SUBGRADE	30.0	91.3	"	90
2-13-80	106 (1)	0'±	27.8	93.3	101	92

* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test #1 taken in the LOT shown.

BY M. Ichiuchi

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS 4th & 5th SERIES
INCREMENT 2, PHASE 1

Field Density Test Results as follows:

Ending FEBRUARY 29, 1980 Sheet 2 of 2 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***
2-13-80	109 (1)	0'±	29.1	93.5	101	93
2-29-80	95 (1)	0'±	17.2	101.7	101	100
"	98 (1)	0'±	19.9	101.1	"	100
"	101 (1)	0'±	19.4	99.3	"	98

* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test #1 taken in the LOT shown.

BY M. Kikuchi

NANAKULI RESIDENCE LOTS 4TH & 5TH SERIES, INCREMENT 2 PHASE 1

TABLE I___ - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	BORROW FROM WAIPAHU			
SAMPLE NO.				
DEPTH BELOW SURFACE				
DESCRIPTION	REDDISH BROWN SILTY CLAY			
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1-1/2"				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Dilatancy				
Toughness				
Dry Strength				
UNIFIED SOIL CLASSIFICATION				
APPARENT SPECIFIC GRAVITY				
CBR TEST (Surcharge - 51 P.S.F.)				
Molding Moisture, %				
Molding Dry Density, P.C.F.				
Swell upon saturation, %				
CBR at 0.1" Penetration				
MOISTURE-DENSITY RELATIONS OF SOILS (ASTM D-1557-70, Method)	A			
Dry to Wet or Wet to Dry	DRY TO WET			
Max. Dry Density (P.C.F.)	101			
Optimum Moisture (%)	28			

REMARKS:

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 3-19-80 By MK

MOISTURE-DENSITY CURVE (ASTM D-1557-70, METHOD A)

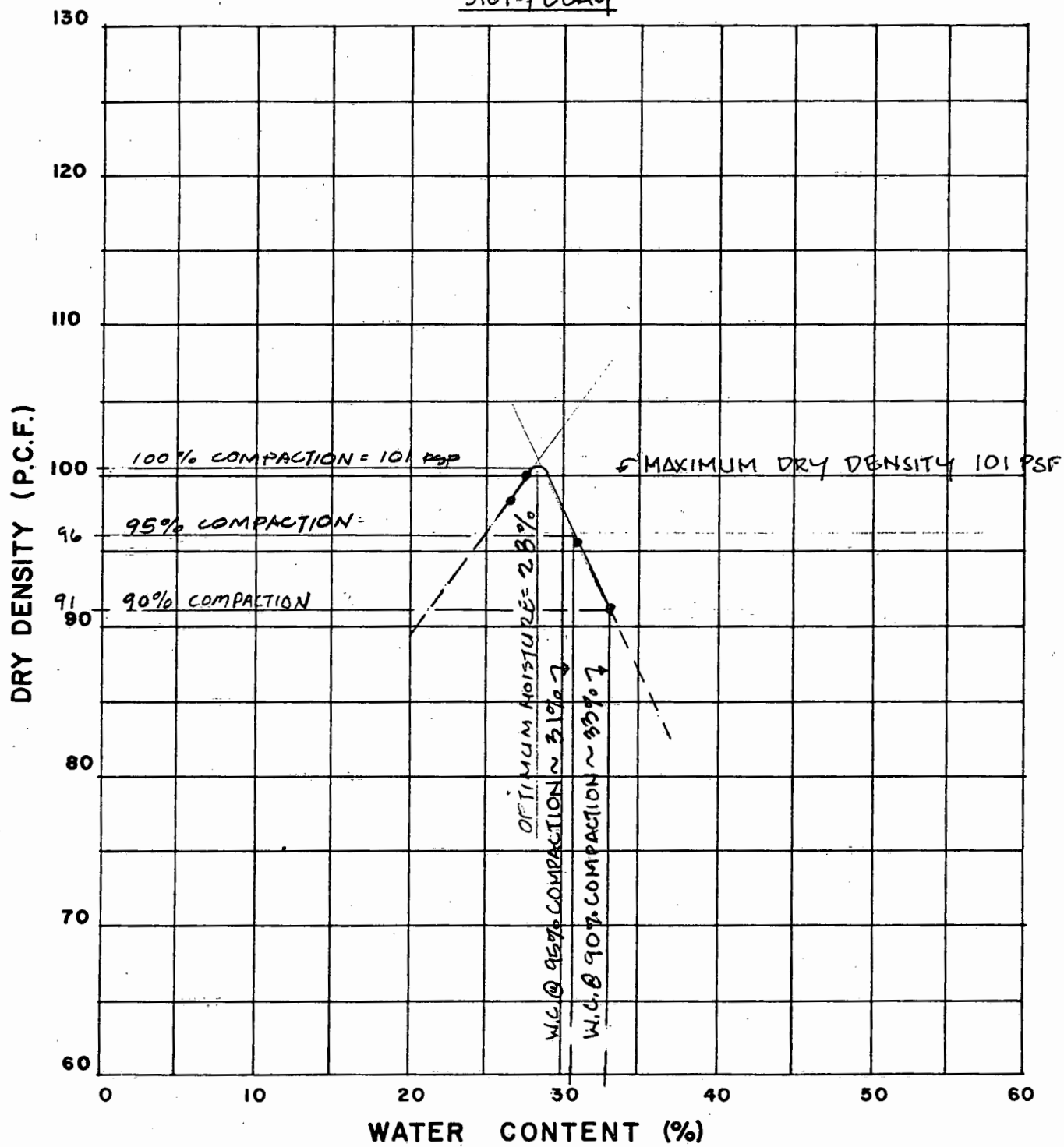
PROJECT: NANAKULI RESIDENCE LOTS 4TH & 5TH SERIES, INCREMENT 2, PHASE 1

LOCATION: NANAKULI, OAHU, HAWAII

SAMPLE NO.: BORROW FROM WAIPAHU

SAMPLE DESCRIPTION: REDDISH-BROWN SILTY CLAY

AGGREGATE: 1/4" MINUS
MOLD SIZE: 4.0"Ø x 4.584 HT.
HAMMER: 10 LBS.
LAYERS: 5
BLOWS: 25/LAYER



WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 2-29-80 BY MK

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO

3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS 4th & 5th SERIES, INCREMENT 2, PHASE I

Field Density Test Results as follows:

Ending MARCH 14 1980 Sheet 1 of 1 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***
3-10-80	101 (1)	0'±	23.3	95.7	98.5	97
"	98 (1)	0'±	17.5	99.2	"	>100
3-14-80	133 (1)	5'±	33.2	88.4	101.5	87
"	135 (1)	3'±	41.6	83.4	"	82

* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test #1 . . . taken in the LOT . shown.

BY M. Kikuchi

TRANSMITTAL FORM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

TO: WILSON, OKAMOTO & ASSOCIATES, INC.
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

DATE: May 19, 1980

Gentlemen:

Re: NANAKULI RESIDENCE LOTS - 4TH & 5TH SERIES
INCREMENT 2, PHASE 1
FIELD DENSITY TEST REPORT

We Are Sending You Herewith [X] Under Separate Cover [ ]

___ Prints	___ Review and comment
X Location Plan	___ Approval
X Field Density Test Results	___ Signature
___ Boring Logs	X Your use and files
___ Laboratory Test Results	
___ Soil Report	
X Technician's Daily Field Reports	

No. of Copies
Sets 2
Sheets ___

General Remarks:

For period ending May 12, 1980.

cc: Department of Hawaiian Home Lands
Attn: Mr. Stanley Wong
Aloha State Corporation

Yours truly,

WALTER LUM ASSOCIATES, INC.

By W. Wakahiro

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS - 4TH & 5TH SERIES
INCREMENT 2, PHASE 1

Field Density Test Results as follows:

Ending MAY 12, 1980 Sheet 1 of 1 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***	
4-3-80	134 (1)	4'±	26.7	96.6	101.5	95	
4-29-80	134 (2)	3'±	37.7	86.6	101.5	85	
"	135 (1)	3'±	37.2	86.4	"	85	
"	135 (2)	2'±	30.5	92.8	"	91	
5-5-80	113 (1)	4'±	27.6	90.1	101.5	89	HARD
5-12-80	133 (1)	2'±	35.0	74.8	101.5	74	TO BE REROLLED & RETESTED

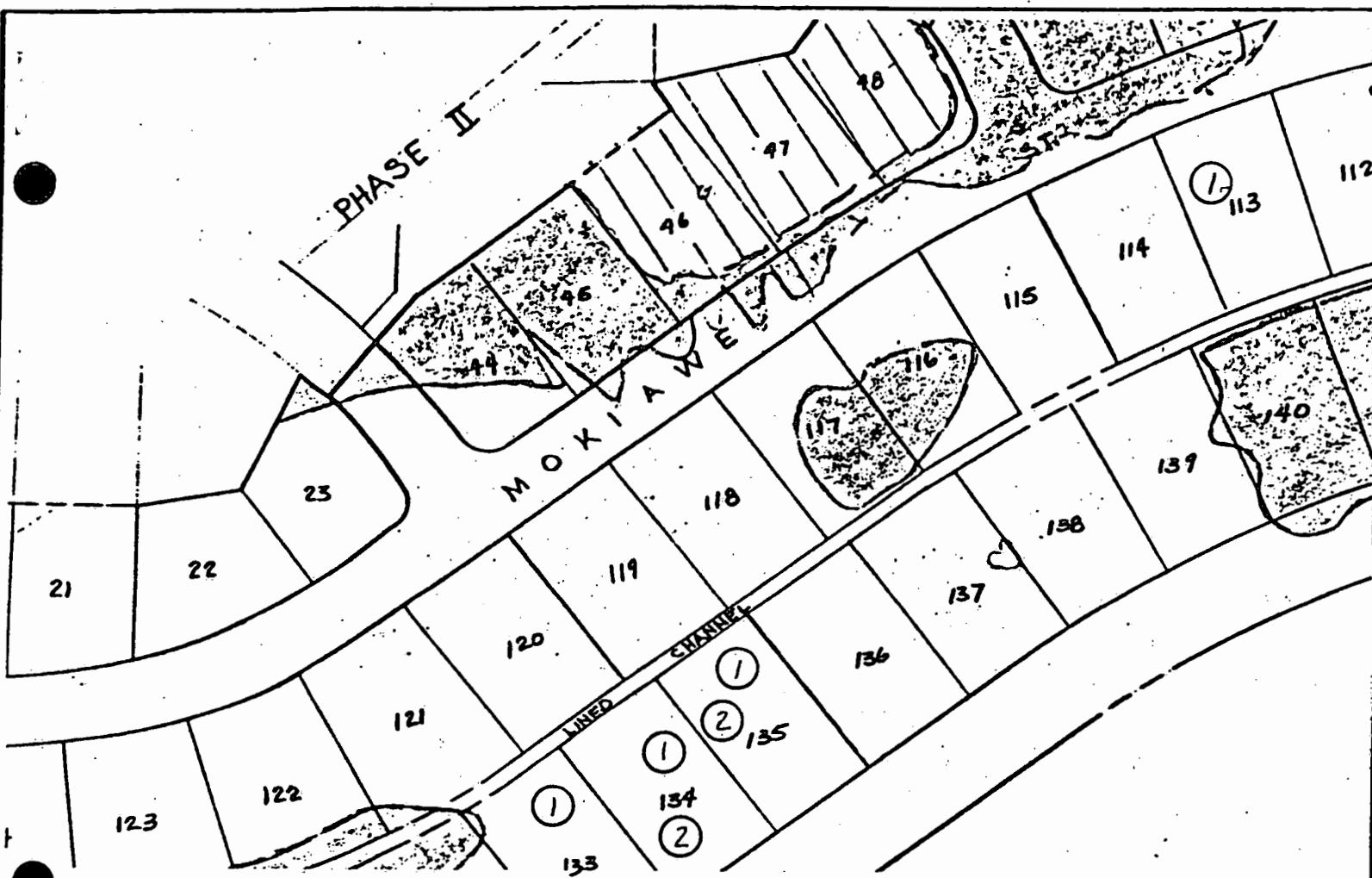
* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test #1 taken in the LOT shown.

BY Ronald S Ah



NOTE:

① INDICATES THE APPROXIMATE AREA OF TEST #1 TAKEN IN THE LOT SHOWN. FOR TEST RESULTS, SEE THE SUMMARY.

TEST LOCATION SKETCH
NANAKULI RESIDENCE LOTS 4th & 5th
SERIES INCREMENT 2, PHASE 1
NANAKULI, OAHU, HAWAII
TAX MAP KEY: 8-9-07: 143

Dr.	WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVE. CIVIL ENGINEERS PHONE 737-3931	Sheet
Date		
Rev.		of

TEST DATE 4-3-80 TO 5-12-80

TRANSMITTAL FORM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

TO: WILSON, OKAMOTO & ASSOCIATES, INC. DATE: August 12, 1980

1150 South King Street, Suite 800

Honolulu, Hawaii 96814

Gentlemen:

Re: NANAKULI RESIDENCE LOTS - 4TH & 5TH SERIES

INCREMENT 2, PHASE 1

FIELD DENSITY TEST REPORT

We Are Sending You Herewith [X] Under Separate Cover [ ]

____ Prints	____ Review and comment
_X_ Location Plan	____ Approval
_X_ Field Density Test Results	____ Signature
____ Boring Logs	_X_ Your use and files
____ Laboratory Test Results	
____ Soil Report	
_X_ Technician's Daily Field Reports	

No. of Copies
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General Remarks:

For period ending July 10, 1980.

cc: Department of Hawaiian Home Lands
Attn: Mr. Stanley Wong
Aloha State Corporation

Yours truly,

WALTER LUM ASSOCIATES, INC.

By W. Wakahiro

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS 4TH & 5TH SERIES
INCREMENT 2, PHASE 1

Field Density Test Results as follows:

Ending JULY 10 1980 Sheet 1 of 1 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***	
6-3-80	136 (1)	2'±	33.2	78.1	101.5	77	TO BE REROLLED & RETESTED
6-4-80	RETEST 136 (2)	2'±	30.7	91.0	101.5	90	
"	138 (1)	1'±	29.2	91.3	"	90	
6-17-80	181 (1)	0'±	27.0	92.9	101.5	92	
6-19-80	113 (1)	4'±	15.1	112.9	116	97	
6-20-80	113 (2)	2'±	25.0	95.4	101.5	94	
6-26-80	149 (1)	0'±	32.6	92.2	101.5	91	
"	147 (1)	0'±	24.6	94.9	101.5	93	
6-27-80	150 (1)	0'±	30.6	96.7	101.5	95	
7-10-80	112 (1)	0'±	25.8	100.3	101.5	99	

* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test #1 taken in the LOT shown.

BY J. Sugihara

TRANSMITTAL FORM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

TO: WILSON, OKAMOTO & ASSOCIATES, INC.
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

DATE: September 30, 1980

Gentlemen:

Re: NANAKULI RESIDENCE LOTS - 4TH & 5TH SERIES
INCREMENT 2, PHASE I
FIELD DENSITY TEST REPORT

We Are Sending You Herewith [X] **Under Separate Cover** [ ]

____ Prints	____ Review and comment
_X_ Location Plan	____ Approval
_X_ Field Density Test Results	____ Signature
____ Boring Logs	_X_ Your use and files
____ Laboratory Test Results	
____ Soil Report	
X Technician's Daily Field Reports	

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General Remarks:

For period ending September 16, 1980.

cc: Department of Hawaiian Home Lands
Attn: Mr. Stanley Wong
Aloha State Corporation

Yours truly,

WALTER LUM ASSOCIATES, INC.

By W. Wakahiro

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS 4th & 5th SERIES
INCREMENT 2, PHASE 1

Field Density Test Results as follows:

Ending SEPTEMBER 16 1980 Sheet 1 of 1 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***	
8-6-80	115 (1)	0'±	31	90.0	101.5	89	
8-19-80	116 (1)	0'±	31	88.6	101.5	87	
"	119 (1)	0'±	32	89.7	"	88	
9-1-80	112 (1)	0'±	25.3	90.0	101.5	89	
9-16-80	121 (1)	0'±	29.9	100.0	101.5	99	TO BE SCARIFIED & RETESTED

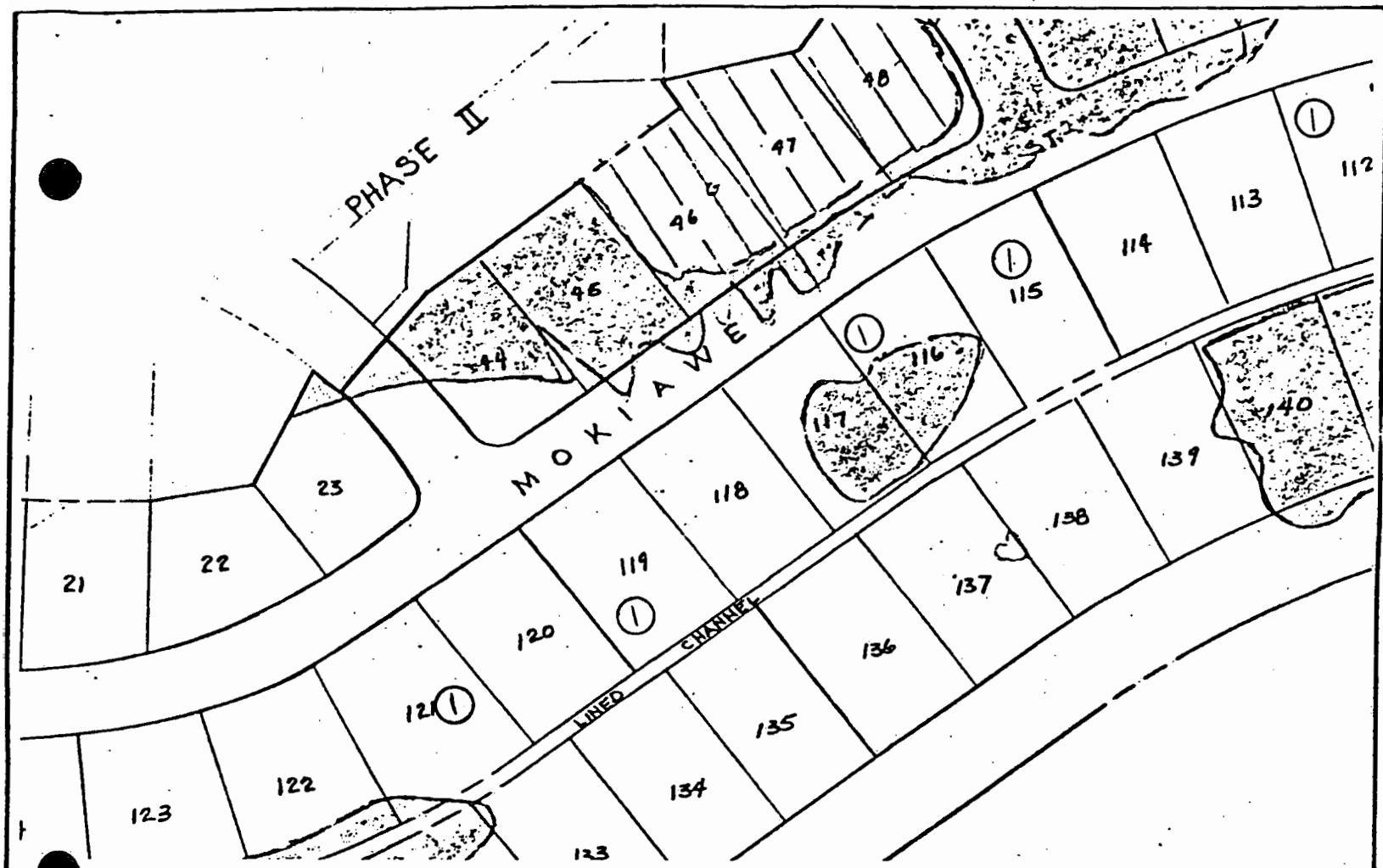
* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D 1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test #1 taken in the LOTS shown.

BY M. Kakuchi



NOTE:

① INDICATES THE APPROXIMATE AREA OF TEST #1 TAKEN IN THE LOT SHOWN. FOR TEST RESULTS, SEE THE SUMMARY.

Date: From 8-6-80 to 9-16-80.

TEST LOCATION SKETCH
NANAKULI RESIDENCE LOTS 4th & 5th SERIES, INCREMENT 2, PHASE 1
NANAKULI, OAHU, HAWAII
TAX MAP KEY: 8-9-07: 123

Dr.	WALTER LUM ASSOCIATES, INC.	Sheet
Date	3030 WAIALAE AVE.	
Rev.	CIVIL ENGINEERS	of
	PHONE 733-7931	

TRANSMITTAL FORM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

TO: WILSON, OKAMOTO & ASSOCIATES, INC. DATE: November 5, 1980

1150 South King Street, Suite 800

Honolulu, Hawaii 96814

Gentlemen:

Re: NANAKULI RESIDENCE LOTS - 4TH & 5TH SERIES

INCREMENT 2, PHASE 1

FIELD DENSITY TEST REPORT

We Are Sending You Herewith [X] Under Separate Cover [ ]

____ Prints	____ Review and comment
X Location Plan	____ Approval
X Field Density Test Results	____ Signature
____ Boring Logs	X Your use and files
____ Laboratory Test Results	
____ Soil Report	
X Technician's Daily Field Reports	

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General Remarks:

For period ending October 8, 1980.

cc: Department of Hawaiian Home Lands
Attn: Mr. Stanley Wong
Aloha State Corporation

Yours truly,

WALTER LUM ASSOCIATES, INC.

By W. Wakahiro

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS
4TH & 5TH SERIES

Field Density Test Results as follows: INCREMENT 2 PHASE 1

Ending OCTOBER 8 1980 Sheet 1 of 1 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***	
9-17-80	122 (1)	0'±	20.5	95.1	101.5	94	TO BE REWETTED & RETESTED
"	121 (1)	0'±	22.4	93.3	"	92	↓
10-1-80	122 (RETEST) (2)	0'±	30.3	87.3	101.5	86	
"	121 (RETEST) (2)	0'±	34.9	87.3	"	86	
10-8-80	123 (1)	0'±	24.3	95.3	101.5	94	

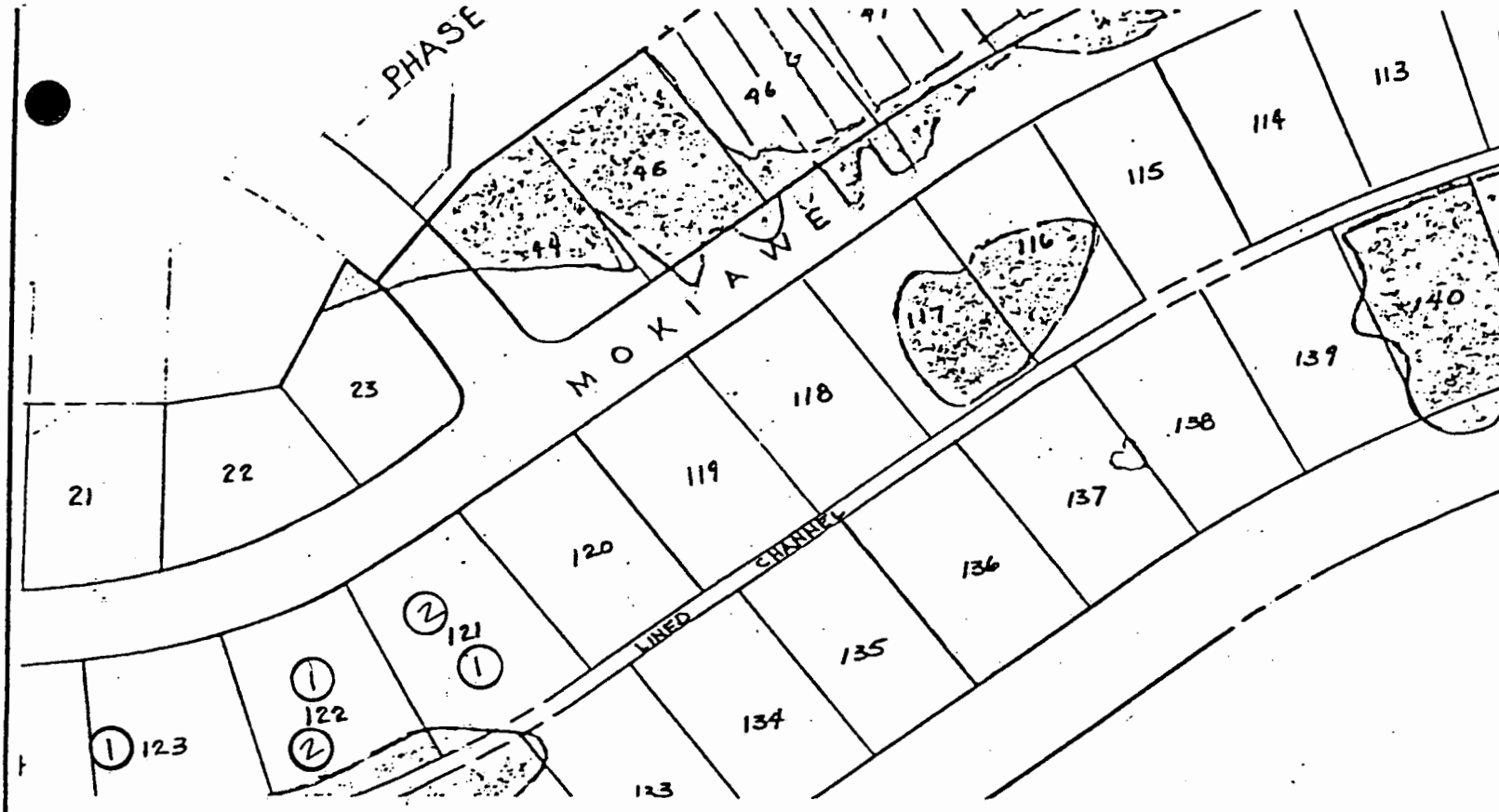
* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test #1.. taken in the LOTS shown.

BY M. Kikuchi



NOTE:

① INDICATES THE APPROXIMATE AREA OF TEST #1 TAKEN IN THE LOT SHOWN. FOR TEST RESULTS, SEE THE SUMMARY.

TEST LOCATION SKETCH
NANAKULI RESIDENCE LOTS 4th & 5th
SERIES, INCREMENT 2, PHASE 1
NANAKULI, OAHU, HAWAII
TAX MAP KEY: 8-9-07: 123

Dr.	WALTER LUM ASSOCIATES, INC.	Sheet
Date	3030 WAIALAE AVE.	
Rev.	CIVIL ENGINEERS	of
	PHONE 737-3931	

TEST DATES: FROM: 9-17-80 TO 10-8-80

TRANSMITTAL FORM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

TO: WILSON, OKAMOTO & ASSOCIATES, INC. DATE: December 18, 1980

1150 South King Street, Suite 800

Honolulu, Hawaii 96814

Gentlemen:

Re: NANAKULI RESIDENCE LOTS - 4TH & 5TH SERIES
INCREMENT 2, PHASE I
FIELD DENSITY TEST REPORT

We Are Sending You Herewith [X] Under Separate Cover [ ]

___ Prints	___ Review and comment
X Location Plan	___ Approval
X Field Density Test Results	___ Signature
___ Boring Logs	X Your use and files
X Laboratory Test Results	
___ Soil Report	
X Technicians Daily Field Report	

No. of Copies
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General Remarks:

For period ending December 4, 1980.

cc: Department of Hawaiian Home Lands
Attn: Mr. Stanley Wong
Aloha State Corporation

Yours truly,

WALTER LUM ASSOCIATES, INC.

By W. Wakahiro

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS, 4th & 5th SERIES, INCREMENT 2, PHASE I

Field Density Test Results as follows:

Ending DECEMBER 4 1980 Sheet ____ of ____ Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***
12-1-80	RETEST 133 (1)	2'±	26	86	101.5	85
12-2-80	135 (1)	0'±	24	91	103	89
"	STA. 5+50 ±	15'±	8.2	126	128	99
"	STA. 6+20±	14'±	8.5	131	"	>100
12-3-80	STA. 6+40'±	12'±	9.2	127	128	99
"	STA. 5+60'±	11'±	11.7	118	"	92
"	STA. 6+00'±	10'±	11.2	118	"	92
"	STA. 5+80'±	9'±	14.9	118	"	92
12-4-80	STA. 5+00'±	8'±	13.5	149	128	>100
"	STA. 5+50'±	6'±	12.0	130	"	>100
"	STA. 6+50'±	4'±	12.8	135	"	>100
"	STA. 4+50'±	2'±	10.6	139	"	>100
"	STA. 7+00'±	1'±	10.4	131	"	>100
"	STA. 6+00'±	0'±	13.1	124	"	97

BUTTRESS SLOPE ALONG REAR OF LOTS 133, 134, 135, & 136

* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test ..... taken in the ..... shown.

BY W. W.

NANAKULI RESIDENCE LOTS, 4th & 5th SERIES, INC. 2, PHASE I

TABLE I___ - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	BORROW FROM			
SAMPLE NO.	P.C.&R QUARRY			
DEPTH BELOW SURFACE	–			
DESCRIPTION	REDDISH BROWN SILTY SAND W/ GRAVEL			
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1-1/2"	100			
1"	100			
1/2"	90			
#4	70			
#10	53			
#20	40			
#40	33			
#100	24			
#200	19			
ATTERBERG LIMITS				
Air Dried or Natural				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Natural Water Content, %				
Dilatancy				
Toughness				
Dry Strength				
UNIFIED SOIL CLASSIFICATION	SM			
APPARENT SPECIFIC GRAVITY	3.06			
CBR TEST (Surcharge - 51 P.S.F.)				
Molding Moisture, %				
Molding Dry Density, P.C.F.				
Swell upon saturation, %				
CBR at 0.1" Penetration				
MOISTURE-DENSITY RELATIONS OF SOILS				
(ASTM D-1557-70, Method)	D			
Dry to Wet or Wet to Dry	DRY TO WET			
Max. Dry Density (P.C.F.)	128			
Optimum Moisture (%)	12.0			

REMARKS:

WALTER LUM ASSOCIATES, INC.
STRUCTURAL & SOIL ENGINEERS

Date 12-12-80 By W.W.

MOISTURE-DENSITY CURVE (ASTM D-1557-70, METHOD D)

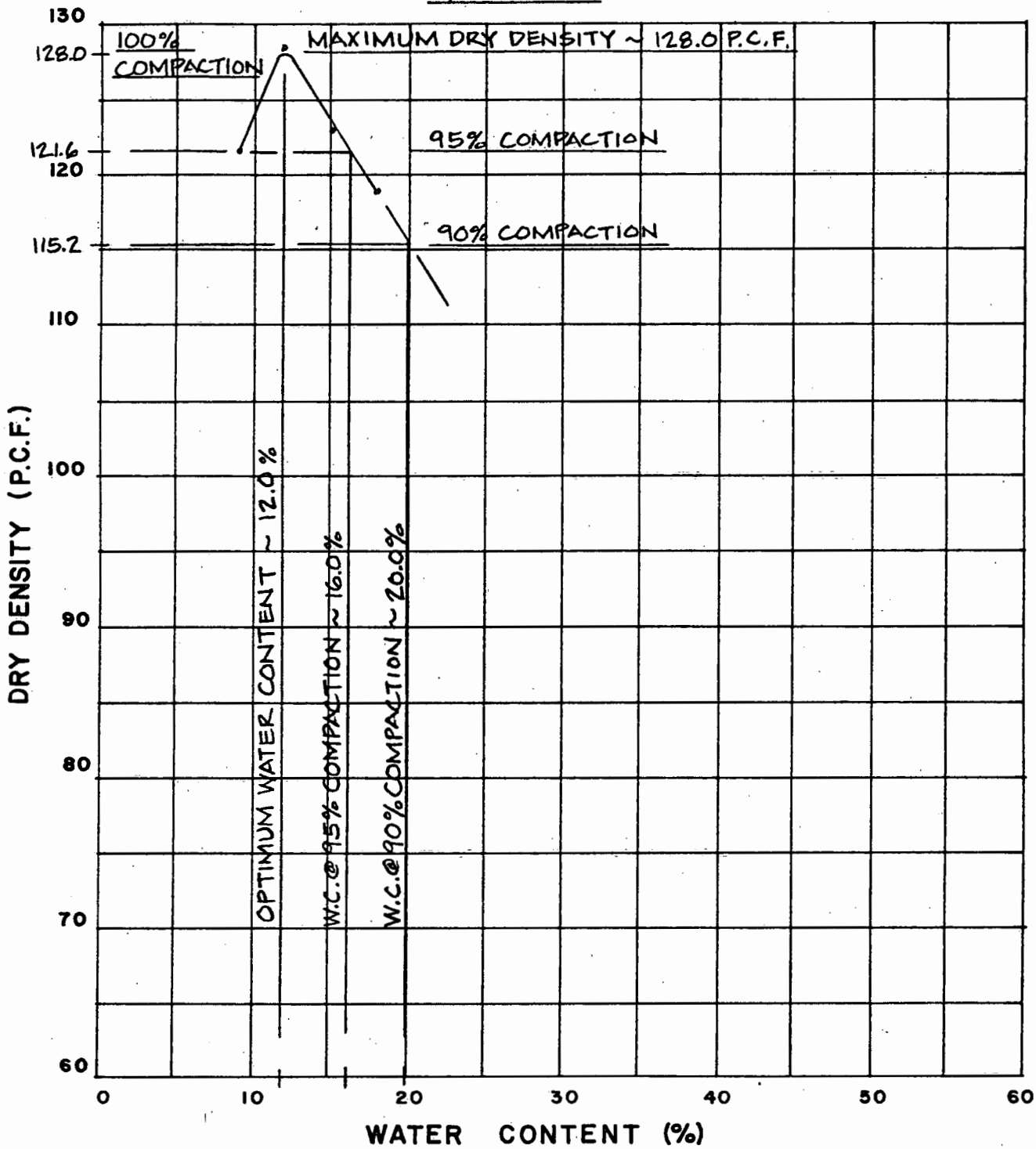
PROJECT: NANAKULI RESIDENCE LOTS, 4th & 5th SERIES, INC. 2, PHASE 1

LOCATION: NANAKULI, OAHU, HAWAII

SAMPLE NO.: P.C. & R QUARRY WASTE

SAMPLE DESCRIPTION: REDDISH BROWN SILTY SAND W/ GRAVEL

AGGREGATE: 3/4" MINUS
MOLD SIZE: 6.0"ϕ x 4.584" HT.
HAMMER: 10 LBS.
LAYERS: 5 LAYERS
BLOWS: 56/LAYER



WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 12-3-80 BY GYS

TRANSMITTAL FORM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

TO: WILSON, OKAMOTO & ASSOCIATES, INC.
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

DATE: January 15, 1981

Gentlemen:

Re: NANAKULI RESIDENCE LOTS - 4TH & 5TH SERIES
INCREMENT 2, PHASE I
FIELD DENSITY TEST REPORT

We Are Sending You Herewith [X] Under Separate Cover [ ]

____ Prints	____ Review and comment
_X_ Location Plan	____ Approval
_X_ Field Density Test Results	____ Signature
____ Boring Logs	_X_ Your use and files
____ Laboratory Test Results	
____ Soil Report	
_X_ Technician's Daily Field Report	

No. of Copies
Sets 2
Sheets ____

General Remarks:

For period ending December 29, 1980.

cc: Department of Hawaiian Home Lands
Attn: Mr. Stanley Wong
Aloha State Corporation

Yours truly,

WALTER LUM ASSOCIATES, INC.

By W. Wakahiro

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

FIELD DENSITY TEST REPORT

NANAKULI RESIDENCE LOTS, 4th & 5th SERIES, 2ND INCR., PHASE I

Field Density Test Results as follows:

Ending DEC. 29 19 81 Sheet 1 of 1 Sheets

Date	Lot No.	Fill Layer*	Moisture Content	Dry Density**	Standard Density**	Relative Compaction***
12-10-80	124 (1)	0'±	33	91	101.5	90
"	133 (1)	0'±	33	88	"	87
"	136 (1)	0'±	34	88	"	87
12-29-80	21 (1)	0'±	6.6	124	128	97
"	23 (1)	0'±	9.1	123	128	96

* Approximate depth below finish grade.

** Density in pounds per cubic foot. Standard density refers to density as indicated by the ASTM Method, D-1557-70

*** Tests indicate the relative compaction of the soils only at the test locations.

(1) Indicates Test #1 taken in the Lot shown.

BY WN.

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